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ABSTRACT

A comprehensive listing of all current United States Atomic Energy Commission (USAEC) films, this catalog describes 232 films in two major film collections. Part One: Education-Information contains 17 subject categories and two series and describes 134 films with indicated understanding levels on each film for use by schools. The categories include such subjects as: Biology and Agriculture, Environment and Ecology, Industrial Applications, Medicine, Peaceful Uses, Power Reactors, and Research. Part Two: Technical-Professional lists 16 subject categories and describes 98 technical films for use primarily by professional audiences such as colleges and universities, industry, researchers, scientists, engineers and technologists. The subjects include: Engineering, Fuels, Medicine, Peaceful Nuclear Explosives, Physical Research, and Principles of Atomic Energy. All films are available from the five USAEC libraries listed. A section on "Advice To Borrowers" and request forms for ordering AEC films follow. (LK)

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FILM 16 mm

UNITED STATES ATOMIC ENERGY COMMISSION

COMBINED CATALOG

PART ONE. EDUCATION-INFORMATION
PART TWO. TECHNICAL-PROFESSIONAL

1972

Please order films from AEC Libraries listed on inside cover

SE 014 815

NOTICE

With the issuance of this 1972 catalog, the USAEC announces that all the domestic film libraries (except Alaska, Hawaii, and Puerto Rico) have been consolidated into one new library. From now on all requests for USAEC films should be sent to this address:

USAEC—TIC Film Library
P. O. Box 62
Oak Ridge, Tennessee 37830

Use this map as a guide to ensure that the library will help you meet your showing dates. The concentric circles, with Oak Ridge at the center, illustrate the number of days it will take for films to move normally via the postal service. Please allow two additional weeks for the library to process your request. After use, return the films immediately; other borrowers may be waiting for the same subjects.

Unaffected by the consolidation will be the USAEC film libraries in Alaska, Hawaii, and Puerto Rico. Film requests from Alaska should be sent to:

University of Alaska Film Library
Atomic Energy Film Section
Division of Public Service
109 Eielson Building
College, Alaska 99701
Phone:907-479-7296

Film requests from Hawaii for popular or technical films should be sent to the library which stocks these films:

University of Hawaii
CTA Film Library—*AEC Popular Films*
Krauss Hall, Room 108
2500 Dole Street
Honolulu, Hawaii 96822

University of Hawaii
AV Services—*AEC Technical Film Library*
Honolulu, Hawaii 96822
Phone: 808-944-8111

And film requests from Puerto Rico should be sent to:

Film Library
Puerto Rico Nuclear Center
Caparra Heights Station
San Juan, Puerto Rico 00935
Phone: 767-0350

For general information, advice or special assistance on film matters, the USAEC field offices will continue to help you. Write or call:

TIC Film Librarian
USAEC—TIC
P. O. Box 62
Oak Ridge, Tennessee 37830
Phone: 615-483-8611, Ext. 3-4271

Sid L. Schwartz
Office of Information Services
U. S. Atomic Energy Commission
Washington, D. C. 20545
Phone: 301-973-4239

F. Tom Richardson
Office of Information Services
U. S. Atomic Energy Commission,
Northeast Region
376 Hudson Street
New York, N. Y. 10014
Phone: 212-620-3601

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Office of Information Services
U. S. Atomic Energy Commission
P. O. Box E
Oak Ridge, Tennessee 37830
Phone: 615-483-8611, Ext. 3-4231

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9800 South Cass Avenue
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U. S. Atomic Energy Commission
2111 Bancroft Way
Berkeley, California 94704

George Dennis
Information Division
U. S. Atomic Energy Commission
P. O. Box 5400
Albuquerque, N. M. 87115
Phone: 505-264-7239

Savannah River Operations
U. S. Atomic Energy Commission
P. O. Box A
Aiken, South Carolina 29801

ED 067273

COMBINED FILM CATALOG, 1972

United States Atomic Energy Commission

NOTICE

With this 1972 revision, the *USAEC Film Catalogs* have been combined into a two part catalog with all current USAEC films listed in one book.

FREE LOAN FILMS FOR SCHOOL, THE PUBLIC, AND TELEVISION

USAEC motion pictures listed in this catalog are available from the USAEC–TIC Film Library for *free loan* for public nonprofit exhibition. A few sub-libraries may charge a small handling fee. All films, except those described as "NOT cleared for television," may be shown on television programs as a public service.

HOW TO ORDER

A supply of film loan request forms is included as the last pages of the catalog.

Address your film loan requests to:

USAEC–TIC Film Library
P. O. Box 62
Oak Ridge, Tenn. 37830

You may order more than one film at a time and for more than one showing date. In ordering, please refer to each film by its number and full title.

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DEAR FILM USER:

The 1972 revision of the USAEC **COMBINED FILM CATALOG** describes 232 films in two major film collections:

Part One: EDUCATION—INFORMATION contains 17 subject categories and two series, and describes 134 films with indicated understanding levels on each film for use by schools. These films are available to the general public, television stations, and colleges, universities and secondary schools.

The categories have a wide range of interest including such subjects as: Biology and Agriculture, Environment and Ecology, Industrial Applications, Medicine, Peaceful Uses, Power Reactors, and Research.

Included in Part One of the catalog are seven important films on environmental and ecological aspects of nuclear energy programs: "Nuclear Power and the Environment" page 7, "The Atom and the Environment" page 5, "Endless Chain" page 6, "Isotopes in Environmental Control" page 7, "No Turning Back" page 7, "Web of Life" page 9, and "The Warm Coat" page 8.

Part Two: TECHNICAL—PROFESSIONAL lists 16 subject categories and describes 98 technical films for use primarily by professional audiences such as colleges and universities, industry, researchers, scientists, engineers and technologists. The subjects include: Engineering, Fuels, Medicine, Peaceful Nuclear Explosives, Physical Research, and Principles of Atomic Energy.

For reference, a list of subject categories in Part One and Part Two appears on Page iv, and a complete alphabetical index of all the films starts on Page v.

All the films in the catalog are available for free-loan from the five USAEC libraries listed inside the front cover. Additional copies of this catalog are available free of charge from these libraries, or the Audio-Visual Section, Office of Information Services, U. S. Atomic Energy Commission, Washington, D. C. 20545.

In ordering films, please refer to each film by its NUMBER AND FULL TITLE. This will speed the handling of your request.

If you teach science, your attention is directed to the revised USAEC film catalog, **CLASSROOM SCIENCE FILMS**, available from the same sources.

The Editor

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Part One
EDUCATION-INFORMATION

NOTE: All films are described for easy reference by those schools, television stations, civic clubs, government and industrial organizations interested in *education—information* films on atomic energy. To help teachers and program chairmen select from those films which will suit the understanding levels of students and other audiences, all titles in Part One are indicated as suitable for three Understanding Levels:

Understanding Level-1 Elementary School
Understanding Level-2 Junior and Senior High School
Understanding Level-3 College and University

Understanding Level-3 audiences, also see the Part Two Technical—Professional Film descriptions, starting on page 39.

BIOLOGY AND AGRICULTURE

THE ATOM AND THE ENVIRONMENT

. . . . . See page 5.

0043

THE ATOMIC GREENHOUSE (1954). 12½ minutes, black and white.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Shows step by step the use of radioisotopes to trace a plant's absorption of agricultural lime from the soil. Explains how effectiveness of plant's utilization is determined, and why such tests can improve crops by pointing to most efficient use of fertilizers.

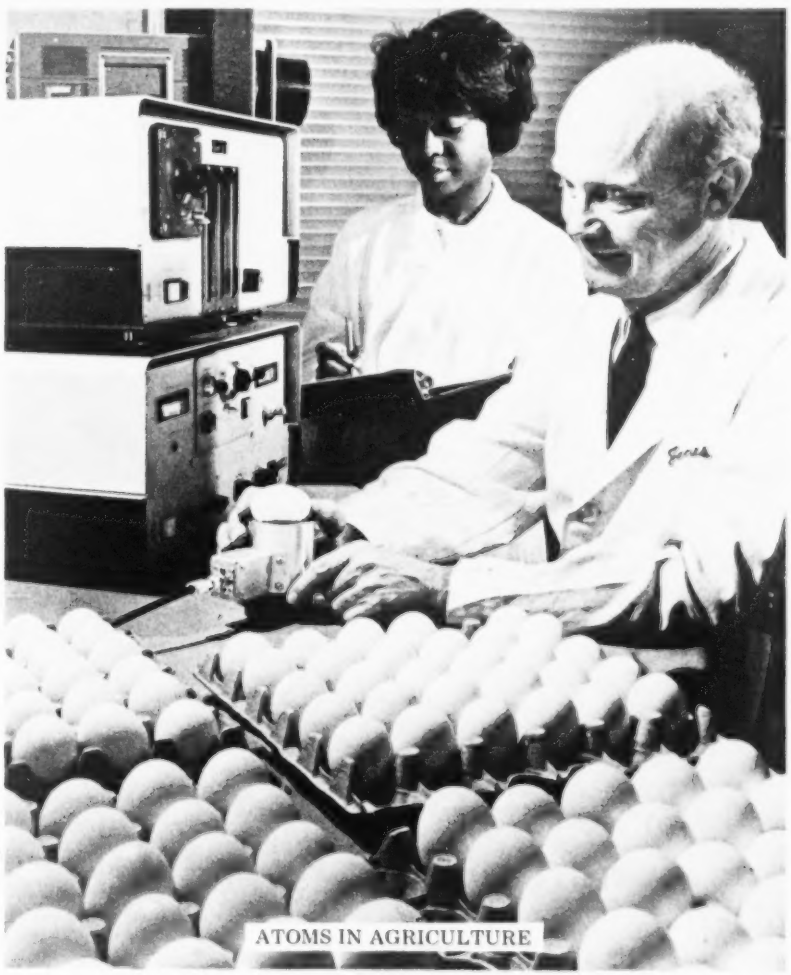
ORDER BY FILM NUMBER AND TITLE

0437

ATOMS IN AGRICULTURE (1969). 26 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Walter J. Klein Co. for the Dow Chemical Company, with the technical assistance of the USAEC. For sale by WRS Motion Picture Laboratory.



ATOMS IN AGRICULTURE

Explores the beneficial applications of atomic energy in the fields of agriculture: as radioactive tracers that—like little radio transmitters—help scientists follow the life processes in plants, animals and soil, and as radiation to treat or improve plants, animals, insects and food products. In a series of interviews at universities, industrial organizations and government research and experiment stations in eight places in the United States, we meet agronomists, veterinarians, entomologists, nutritionists, biochemists and engineers, who show us and explain their work in: the safe and more effective use of pesticides; controlling and understanding the diseases and metabolism of plants and animals; conservation of water; work to fight the staggering crop losses due to weeds, diseases and insects; research to achieve better, higher-yielding crops; studies of animal parasites; studies of cattle feeding; work to eliminate the screwworm fly by irradiation-sterilization; and research on fibers for improved textiles. It is made clear that the atom is an extremely important tool for agricultural scientists.

0459
CONTROLLED PHOTOSYNTHESIS (1971). 24 minutes, color. NOT cleared for television.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Photosynthesis is probably the most important chemical reaction that takes place on earth—for without it there would be no plants, no animals, no life. The film gives an introduction to the structure of leaves, chloroplasts, grana and lamellae; and describes the first part of the process of converting the sun's energy to chemical energy.

The film describes the injection of radioactive carbon-14 into the plant, and tells how this tracer technique is used to determine the series of chemical compounds the plant makes before producing food sugars and also describes some current research on enzyme reactions in plants. It is known that enzymes influence the production of carbohydrates, proteins and fats. It appears possible, by controlling these enzymes, to control photosynthesis and increase the production of protein in the plant's leaves.

Featured is a brief discussion by Dr. Melvin Calvin, Lawrence Berkeley Laboratory, who was awarded a Nobel Prize in 1961 for his research with radioactive tracers on the transformation of raw chemicals into plant sugars.

HONORS: Finalist, 1971 National Educational Film Festival, Oakland, California; Special Award, 1971 13th Annual Industrial Film Awards, New York, N. Y.

ENDLESS CHAIN
. . . . . See page 6.

0114
THE ETERNAL CYCLE (1954). Black and white.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Illustrates use of radioisotope tracers in biological research. Includes study of iron absorption by the blood cells; use of sugars by the body; and biological cycling studies in which "tagged" materials are traced throughout their movement from the soil to plants and animals, and the amounts of absorption during each stage are determined.

FARM FRESH TO YOU
. . . . . See page 10.

FRESHER THE BETTER, THE
. . . . . See page 11.

0156
HARVEST OF AN ATOMIC AGE (1963). 20 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the U. S. Information Agency with the technical assistance of the USAEC, Brookhaven National Laboratory and Michigan State University. For sale by NAC.

Illustrates the progress achieved by U. S. scientists in using radiation to create new strains of disease- and weather-resistant food crops with higher yields. We see both the research work at USAEC's Brookhaven National Laboratory and the field work with new varieties of commercial crops. The specific example shown is the development of the Sanilac bean by Michigan State University plant geneticists. The Sanilac bean is disease-resistant and stands upright, permitting machine-harvesting. The film explains simply the theories of radiation-induced plant mutations, the methods, and the complexity of the long-term work.

ORDER BY FILM NUMBER AND TITLE

0435
MOLECULAR BIOLOGY: An Introduction (1969). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

The new science of molecular biology has emerged to dominate the life sciences and open up the new frontiers of biophysics and biochemical research. To measure and document this exploration into the molecular and atomic levels of the cell, technology has developed more refined and sophisticated research tools: the improved resolution of the electron microscope, the isolation of cell parts by ultracentrifugation, the separation capabilities of chromatography, the localization of autoradiography, and the sensitivity of liquid scintillation counting. The past achievements using these tools strengthen the belief that the function and structure of the cell can be integrated. When used in conjunction with radioactive tracers, these tools may someday contribute the basic information needed to find the cause and cure of human cancer and many other diseases.

0221
NON-ROOT FEEDING OF PLANTS (1958). 21 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Colmes-Werrenrath Productions, Chicago, for Michigan State University and the USAEC. For sale by NAC.

The techniques of applying nutrients to the aboveground parts of plants and the method of tracing the nutrients through the plant's system by means of radioisotopes are shown in this film.

HONORS: 3rd International Days of Motion Pictures for Agriculture.

NO TURNING BACK
. . . . . See page 7.

0296
RADIATION IN BIOLOGY: An Introduction (1962). 13½ minutes, black and white or color.

Suitable for Understanding Level-2.

Produced under the technical direction of USAEC's Argonne National Laboratory by, and for sale by, Coronet Instructional Films. NOT cleared for television.

Explains the meaning of high-energy radiation and shows how this radiation is used in biological research. Briefly reviews light from the sun (wave radiation), radio waves, X rays. Also touches on the various sources of radiation (X-ray machines, nuclear reactors, cosmic rays, the sun, etc.). Radioisotopes are defined, and their life is traced from production through their use as tools in the study of radiation damage. The effect of radiation on living cells is demonstrated by comparisons of plants grown from irradiated and nonirradiated seeds and of mice that had been irradiated with those that had not been irradiated. The film also shows the effects of radiation on bone marrow, on the protective lining of the intestine, and on chromosomes (mutations). The use of radioisotopes to trace chemical processes in plants (the absorption of nutrients) is also covered. Autoradiographs are explained, and the function of a Geiger counter is outlined.

0322
RETURN TO BIKINI (1966). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the University of Washington. For sale by NAC.

Describes the latest scientific survey by a team from the Laboratory of

Radiation Biology of the University of Washington to determine the condition of Bikini and Eniwetok atolls six years after the last nuclear test detonations, and how it is found that there has been tremendous recovery to the biological processes that form the life chain linking man with the tiniest plants, fish and animals in the atolls. Scientists have been studying the biological after-effects of nuclear tests at the mid-Pacific atolls intermittently since 1946. Returning in August 1964, the scientists find that: the islands are once again lush with vegetation, external radiation levels have dropped to levels safe for people and the radioactive burdens in animals and plants are low, rainwater in the soil is safe for drinking, coconut trees are increasing again, all the expected species of fish and sea life are to be found, birds are thriving, and that the sea—surging through the coral reefs—has cleaned, restored and nourished the atolls. Conclusion: the gross results of nuclear testing are fading, and what little biological damage remains is rapidly healing.

HONORS: 5th International Agricultural Film Festival, Trieste, Italy; 15th Annual Melbourne Film Festival, Australia.

0324

THE RIDDLE OF PHOTOSYNTHESIS (1965 Version). 14½ minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Shows role of photosynthesis in growth of food and use of radiocarbon to explore the process. Describes, with animation, key steps in one of the experiments designed to help solve the riddle.

Photosynthesis is the process by which plants use sunlight, water, minerals and carbon dioxide from the air to release oxygen and to form foods such as sugars, starches, fats and proteins. Better understanding of the process may lead to the production of food by chemical methods. In the film, algae, one-cell plants, are submitted to a series of different light exposures to determine chemical changes in relation to exposure time.

HONORS: 5th International Festival of Science Fiction Films, Trieste, Italy; 7th International Agricultural Film Festival, Trieste, Italy.

0325

ROUNDUP (1960). 18¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by, and for sale by, the Motion Picture Service, U. S. Department of Agriculture.

Describes the use of radiation to eradicate the screwworm fly in the southeastern United States, an insect pest that had caused large losses to livestock owners. The screwworm fly deposits its eggs in a cut or insect bite on the skin of a warm-blooded animal. The eggs hatch to worms that feed on live flesh and then fall to the ground, where they burrow into the soil and change to pupae. Ten days later the fly emerges and mates, and the cycle continues. The film shows typical cases of screwworm infestation. Entomologists suggested that since screwworm flies mate only once, if a method of sexually sterilizing flies could be found, eradication was possible. Since X ray was too expensive, radioactive cobalt (^{60}Co) was selected to do the sterilization job. The plan was tested on the tiny island of Curaçao, where sterilized male flies were released from aircraft. In six months the pest was eliminated. Similar operations were followed in Florida and other southeastern states. A huge screwworm factory was built in Florida, where 50 million flies were reared and sterilized in a week, with pupae subjected to 8000 roentgens of gamma rays. Ten million sterilized male flies were airdropped on infested areas. Eventually the screwworm fly was brought under full control and largely eradicated.

HONORS: 2nd International Fishing and Hunting Film Festival, Yugoslavia, "Golden Rocket," 16th International Nuclear Congress, Rome, Italy; Golden Eagle, CINE (Council on International Nontheatrical Events) 1970, Washington, D. C.

THE WARM COAT

. . . . . See page 8.

ORDER BY FILM NUMBER AND TITLE

CAREERS

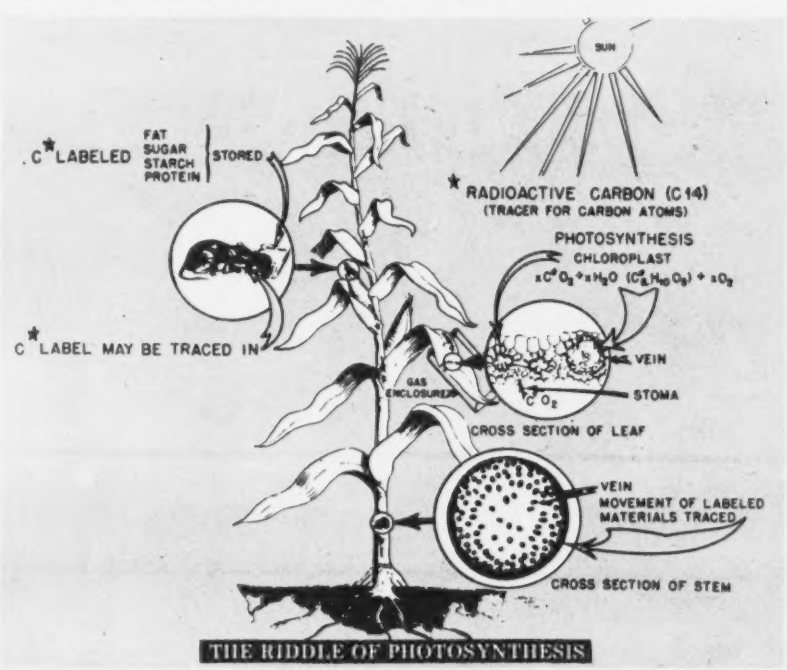
Careers in Nuclear Science and Nuclear Engineering. 3 films produced by the U. S. Army Pictorial Center for the USAEC, with the assistance of the American Nuclear Society. For sale by NAC.

The basic purpose of these three films is to motivate students in their formative years to consider careers in the field of nuclear science and engineering. Each film can be shown independently or can be shown as a series in this order.

0450

1. HORIZONS UNLIMITED (1969). 37 minutes, color.

Suitable for Understanding Level-2.



Urges young people to think carefully about their future and raises certain questions that should be considered in this regard. The growth of nuclear energy and its applications have opened the door for all kinds of career opportunities. Due to the tremendous energy available from the atom, brand new industries have sprung up. The role of nuclear power to produce electricity, desalt seawater, manufacture fertilizer, propel rockets, and mine minerals is described. Nuclear fuel processing is noted as one of the new industries emerging which will recover unused fuel and reclaim radioisotopes, a valuable by-product useful in numerous medical, research, and industrial applications.

Nuclear research and the tools used by nuclear scientists and engineers are briefly examined. Nuclear science has made a substantial contribution to the life sciences, where researchers investigate the biological processes which produce and sustain life. One of the most exciting applications of nuclear energy, thermonuclear fusion, is still to be developed. The potential benefits are many, but taking advantage of them will require creative young minds.

0451

2. PREPARING FOR TOMORROW'S WORLD (1969). 26 minutes, color.

Suitable for Understanding Level-2.

Opens in a high school science laboratory with the physics teacher serving as narrator. The student is asked to examine his interests and abilities with a view toward taking his place in the expanding world of nuclear science and nuclear engineering. The value of building a firm foundation in science, mathematics, and English as early as possible in school is stressed. Participation in extracurricular activities, such as school science fairs, is encouraged.

Visits are then made with several students majoring in some aspect of nuclear science or nuclear engineering at different universities across the country. The difficulty in making a career choice is recognized and the student is encouraged to examine all programs offered by the university. With the flexibility available in the first two years of college and with the help of his faculty counselor, the student will usually be able to plan a career that best suits his capabilities and interests. Nuclear scientists and engineers are needed by government agencies, by industry, and by educational and research institutions engaged in a wide variety of projects, from pure scientific research to development and manufacturing.

Depending upon one's goal, the student is encouraged to continue his education toward an advanced degree. With the availability of graduate fellowships and other assistance, the financial burden is lightened for most. Although this additional commitment adds to the student's time and cost, there are many factors which make these additional investments very worthwhile.

0452

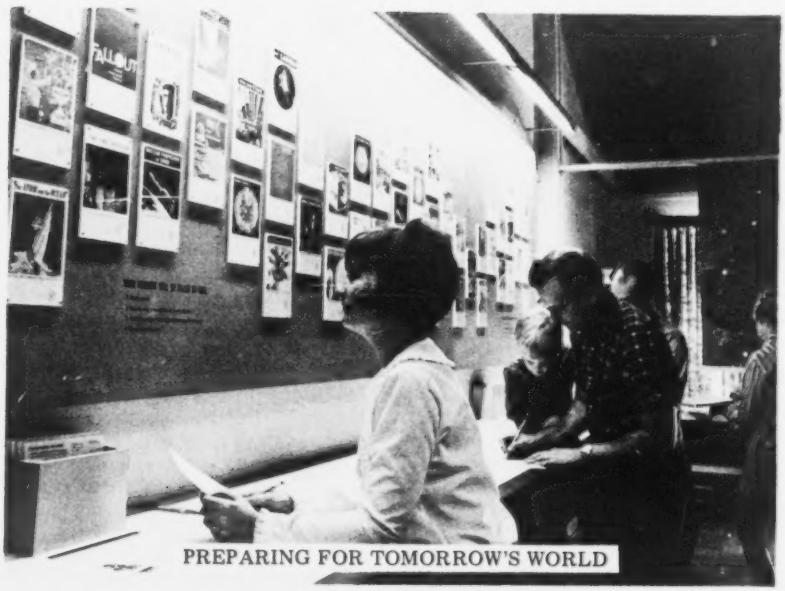
3. YOUR PLACE IN THE NUCLEAR AGE (1969). 26 minutes, color.

Suitable for Understanding Level-2.

Gives the student a picture of the professional environment in which he would be working if he chose a career in nuclear science or engineering. The three major employment areas covered are contractors' laboratories of the U. S. Atomic Energy Commission, commercial nuclear industries, and colleges and universities. Each has a need for trained manpower in nuclear science and technology.

The need for creative ideas is essential to the development of nuclear energy, whether it be in basic or applied research. In a fast-moving field such as nuclear technology, the professional person is expected to prepare reports for scientific and technical journals, attend national or international meetings, and maintain contact

. . . controlled nuclear energy
to increase his energy supply
several hundred times . . .
. . . used nuclear energy to
feed an expanding population
to explore the planets.
HORIZONS UNLIMITED



PREPARING FOR TOMORROW'S WORLD

with other specialists in his field to stay abreast of the latest developments.

For those more interested in the production and development side of the nuclear business, there are numerous opportunities in the growing nuclear power industry. The advantages of and the opportunities for continuing education are again emphasized.

0449

GO FISSION (1969). 14 minutes, color.

Suitable for Understanding Levels-1 and -2.

Produced by Walter J. Klein Co. for Consolidated Edison Company of New York and Pacific Gas and Electric Company, with the technical assistance of the USAEC. For sale by WRS Motion Picture Laboratory.

In a "mod" style with a jazz musical score, this nuclear careers film is designed to appeal to junior and senior high school students. In a kaleidoscopic presentation, many young people are shown at work in various interesting phases of nuclear research and nuclear science and industry.

This unusual film does not have narration in the conventional sense. Instead, we hear young voices asking many varied questions about careers in the atomic field. The fast-paced visuals are, in effect, the "answers" to the questions--questions that cover: education required, clothes, living, recreation, on-job training, where the jobs are, the kind of people with whom one would be associated, the chances for independent research, the careers for women, the types of job opportunities and many others. With sprightly humor, the film makes the serious points that people who work in the scientific and administrative fields of atomic energy are not all geniuses, that opportunities for interesting and important positions are available for all, and that people who work in nuclear energy--whatever they do and wherever they are--are just people.

PEOPLE AND PARTICLES

. . . . . See page 26.

0373

TOMORROW'S SCIENTISTS AT ARGONNE (1965). 13½ minutes, black and white.

Suitable for Understanding Levels-2 and -3.

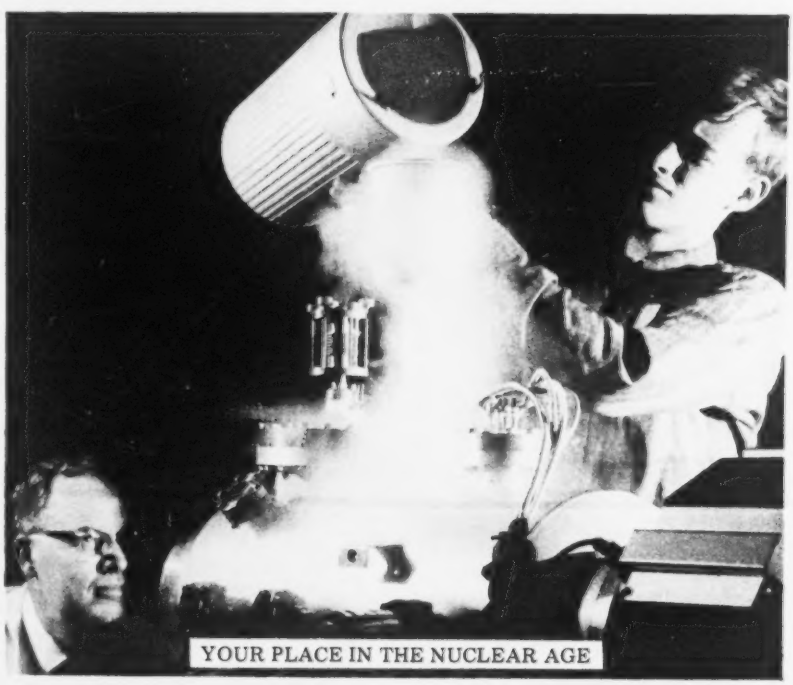
Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Shows USAEC Special Award Winners, selected at the 16th National Science Fair-International at St. Louis, experiencing their "Nuclear Research Orientation Week" at Argonne National Laboratory near Chicago. After brief discussion of the science fair program and the St. Louis fair, the film includes highlights of science projects exhibited by the winners, and the student's inspection of some of Argonne's many research and development facilities. It concludes with a round-table discussion with a distinguished senior scientist, in which the young scientists consider the challenges awaiting them and the steps to be taken toward meeting those challenges.

ENVIRONMENT AND ECOLOGY

0462

THE ATOM AND THE ENVIRONMENT (1971). 22 minutes, color.


YOUR PLACE IN THE NUCLEAR AGE

Suitable for Understanding Level-2 and -3.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Covers many aspects of how atomic energy directly and indirectly helps in man's fight to preserve and restore his threatened environment. The film shows that atomic power stations do not release smoke containing chemical pollutants into the atmosphere, and how excess heat, from coolant water, is controlled and minimized, and may be used beneficially for agriculture and recreation. Other aspects: how radioactive carbon is used as a tracer to test the effectiveness of new, improved insecticides, nontoxic to humans and livestock; how neutron activation analysis produces "atomic fingerprints" that identify poisonous pollutants that are killing fish in the Great Lakes, and can analyze and compare oil samples to help the Coast Guard pinpoint vessels suspected of illegally discharging oil and fouling coastal waters; how radioactive tracers chart the underwater movement of sand which results in clogging of harbors and channels; the use of radioactive tracers to study the ability of flowing streams to purify themselves—resulting in data to aid in the proper placement of sewage plants and factories; how atomic isotopes are used in the analysis of smoke samples and help scientists determine air pollution patterns over cities; and how nuclear tracers assist in the study of the extent to which plants can absorb dangerous pollutants that interfere with the process of photosynthesis, and aid man in learning more about the growing process of plants and trees.

ATOMIC POWER TODAY: Service with Safety . . . . . See page 22.

ATOMS IN AGRICULTURE . . . . . See page 1.

CONTROLLED PHOTOSYNTHESIS . . . . . See page 2.

0457

ENDLESS CHAIN (1971). 28 minutes, color.

Suitable for Understanding Levels-1, -2, and -3.

Produced for the USAEC by Tom Beemer, Films of the Great American Outdoors. For sale by NAC.

A poetic, intimate look at the "endless chain of life" in the desert: the ceaseless transfer of the sun's energy to plants, to insects, and to animals. We see the life—death cycle, as energy passes from a plant . . . to a beetle . . . a pocket mouse . . . a snake . . . a hawk—and the cycle is completed as bird droppings washed down by rain become nutrients for plants.

But man eventually intrudes, threatening the environment essential to his own existence. Will man and his mishandling of nature end acceptable conditions on earth? To save the environment, one must understand it. Here in Washington State, Project ALE (Arid Lands Ecology) is an ecological study sanctuary set aside by the U. S. Atomic Energy Commission to investigate arid lands representative of two-thirds of the earth's land.

Since the ecology of arid lands offers an ideal opportunity to understand nature's endless chain, a team of scientists from Battelle-Northwest, representing all the varied life sciences, investigate the plants, animals and interacting food chains of the desert. We watch as the scientists search for data, later preserved and stored by computers, with the ultimate objective of achieving guidelines so man can learn to protect the delicate web of life around him and his irreplaceable environment. For a no-narration version of this film see WEB OF LIFE, page 9.

HONORS: 18th International Nuclear Congress, Rome, Italy; Diploma, 1st International Days of Scientific & Didactic Films, University of Madrid, Spain; Festival Finalist, National Educational Film Festival, Oakland, California; Gold Ribbon in Ecology, 1971 American Film Festival, New York City, N. Y.; 14th International Golden Mercury Film Prize, Venice, Italy; Second Prize, Silver Medal and Trophy of the Rome Fair, 5th International Review of Didactic Film & 3rd International Review of TV Educational Films, Rome, Italy; 25th Edinburgh International Film Festival, Edinburgh, Scotland; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil; 9th Show of Technical, Scientific & Educational Films in Industry, Pardubice, Czechslovakia; Golden Eagle 1971 CINE (Council on

International Nontheatrical Events), Washington, D. C.; Chris Award in Education 19th Columbus Film Festival, Columbus, Ohio; 16th International Festival of Scientific & Educational Film, University of Padua, Italy; 9th ANZAAS International Scientific Film Exhibition Australian & New Zealand Association for the Advancement of Science.

HARVEST OF AN ATOMIC AGE
. . . . . See page 2.

0466
ISOTOPES IN ENVIRONMENTAL CONTROL (1971). 14 minutes.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by Battelle Memorial Institute. For sale by NAC.

Shows some of the ways radioactive atoms are being used to help man safeguard his environment. Neutron activation analysis is applied to tracing oil spills. Radioactive tracers show the absorption of oxygen by flowing water. Other tracers are used to determine the drifting of sand on the ocean floor. Chemical and nuclear techniques are used in combination to study air pollution by sulfur oxides.

NO GREATER CHALLENGE
. . . . . See page 16.

ORDER BY FILM NUMBER AND TITLE

0461
NO TURNING BACK (1971). 27½ minutes.

Suitable for Understanding Levels-2 and -3.

Produced by the Office of Information Services, USAEC. For sale by NAC.

Since its beginning, the U. S. Atomic Energy Commission has made outstanding contributions to environmental research. This film visits some of the men involved in AEC-supported ecology studies at laboratories and sites across the country. As these scientists discuss their own areas of research, the camera dwells, at each location, on the forms and variety of life, the interaction of plants and animals and man's impact on nature and the environment.

Among the areas visited are: the ALE (Arid Land Ecology) reserve—a vast, desert steppe laboratory in southeastern Washington State; the "Climatron"—a tropical forest study at the Missouri Botanical Garden; AEC plants—Savannah River in South Carolina and Hanford on the Columbia River—where extensive research on river ecosystems takes place; Lake Michigan—where Argonne National Laboratory scientists study the impact of industry on natural waterways; a vast, isolated forest near Oak Ridge, Tennessee—where the effects of large-scale fertilization on forests and streams can be studied in depth; an airport near Brookhaven National Laboratory—where industry's smoke plumes are monitored to study pollution patterns in the layers of atmosphere that blanket large metropolitan areas.

Narrated by Lorne Greene of television's "Bonanza" fame, this film points up AEC's long-term commitment to environmental research and the clear importance of further study in the search for final answers. It helps us to see man's obligation to the fragile biosphere that sustains him and his need to improve the quality of life on earth.

HONORS: 9th ANZAAS International Scientific Film Exhibition, Association for the Advancement of Science, Australia and New Zealand.

0447
NUCLEAR POWER AND THE ENVIRONMENT (1969). 14 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by Starbecker Inc. For sale by NAC.

In a strikingly beautiful presentation, the film takes up the problems that stem from the growing demands for electricity in the U. S., demands which are doubling every 10 years. To meet these future needs, the most practical means of producing power in large amounts is to build steam-powered electrical power plants—both fossil-fueled and nuclear.

The film discusses the great care taken in studying and controlling effects of nuclear power plants on the environment. Environmental surveys

NUCLEAR POWER AND THE ENVIRONMENT

are conducted to predict and control effects on fish life, ecology and hydrology. Problems from thermal effects (heated water) are avoided, with artificial cooling ponds, cooling towers, and careful selection of the plant site. The releases of radioactivity to the atmosphere and in the cooling water are carefully controlled under rigid regulations. Storage of waste products, safety of nuclear plants and esthetic values are also touched in this currently important presentation.

HONORS: 1970 National Youth Conference on the Atom, Chicago, Illinois; 8th Show of Technical Scientific Films in Industry, Pardubice, Czechoslovakia; 5th International Conference on Water Pollution Research, San Francisco, California; 1970 CINE (Council on Nontheatrical Events), Washington, D. C.; 11th International Award of the Technical Cinema, Rome, Italy; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil.

ORDER BY FILM NUMBER AND TITLE

NUCLEAR POWER IN THE UNITED STATES . . . . . See page 53.

RETURN TO BIKINI . . . . . See page 2.

THE RIDDLE OF PHOTOSYNTHESIS . . . . . See page 3.

ROUNDUP . . . . . See page 3.

0441

THE WARM COAT (1969). 13½ minutes, color.

Suitable for Understanding Levels-1, -2, and -3.

Produced by the Office of Information Services, USAEC. For sale by NAC.

A conservation story of the transplant operation of sea otters from Amchitka to Alaskan coves. Almost extinct at the turn of this century, the sea otter, known for its fine, dense, very valuable fur, is staging a comeback in Alaskan waters. The State of Alaska, with cooperation from the U. S. Atomic Energy Commission, has airlifted several hundred sea otters from Amchitka, an island in the Aleutian chain, to other areas where natural food resources are more plentiful and where large otter colonies had lived centuries ago. The transplant took place in the summer of 1968 and, hopefully, sea otters will thrive and multiply in the new environment.

The Warm Coat is a film that watches the shy, whiskered bright-eyed sea otter dive and swim with easy grace. It catches him at play and attending to the business of survival . . . caring for pups, dining on great quantities of shellfish and other foods from the sea, hiding from his enemies in tangled beds of sea kelp.

HONORS: 2nd International Fishing & Hunting Film Festival, Yugoslavia; Golden Eagle, CINE (Council for Nontheatrical Events) 1970, Washington, D. C.; 2nd International Scien-

THE WARM COAT

tific Film Festival, Rio de Janeiro, Brazil; 1970 Argentine Film Festival, University of Buenos Aires, Argentina; 13th International Days of the Short Film (Festival of Tours), France; 17th International Nuclear Congress, and Golden Rocket, 11th International Award of the Technical Cinema, Rome, Italy; 1970 International Small-Sized Film Festival, Salerno, Italy; 5th International Festival of Countries and People, La Spezia, Italy; 8th International Festival of Marine and Exploration Films, Toulon, France; 4th Festival of Scientific and Technical Films, Yugoslavia.

0480

WEB OF LIFE: Endless Chain (1972). 28 minutes, color.

Suitable for Understanding Levels-1, -2, and -3.

Produced by Films of the Great Outdoors and USAEC's Office of Information Services. For Sale by NAC.

This tour de force is a version of the film ENDLESS CHAIN produced without narration. Now presented with an improved musical score, a ballad and sound effects, the film takes an intimate look at the endless chain of life in the desert as recorded by Tom Beemer, nationally acclaimed nature documentarian. One test of a good film is—does it "play" without narration? WEB OF LIFE does more than play—it lives. Without narration, this film will be particularly useful to younger audiences and all age groups. This no-talk version will be ideal for club meetings, nature study, environmentalists and biology classes. Of course, foreign audiences will appreciate this treatment. For descriptive subject matter, see the description for ENDLESS CHAIN, on page 6.

WEB OF LIFE

ORDER BY FILM NUMBER AND TITLE

INDUSTRIAL APPLICATIONS AND SPINOFF

0039

THE ATOMIC FINGERPRINT (1964). 12½ minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Explains neutron activation analysis, a highly sensitive and power analytical technique with wide applications in the basic and applied sciences, which involves the use of neutrons to make substances radioactive, followed by analysis of the radiations emitted, to determine which elements are present and their amounts. The film demonstrates some of the many applications of neutron activation analysis in crime detection, geology and soil science, analysis of art and archeological objects, oil refining, agriculture, electronics, biology and medicine, and space sciences. Various techniques of neutron activation—making a sample radioactive—are explained, as well as the instruments and methods used in analyzing the activated samples. These include the use of the gamma-ray spectrometer and the technique of "spectrum stripping"—the electronic subtraction of the gamma-ray spectra of one or more known elements from that of a multi-element sample.

0438

ATOMIC REVOLUTION IN WOOD (1969). 23 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the Army Pictorial Center. For sale by NAC.

Story of a new, important peaceful application of nuclear energy—the fusing of wood and plastic by irradiation into an amazing combination-substance which has all the esthetic appeal of wood, but is greatly improved in hardness, abrasion resistance and durability. The film traces the development of radiation processed wood-plastic materials from initial USAEC development efforts through industry's commercialization activities. By means of animation and live action, the film explains the process for making this new material and describes its superior characteristics and wood-working properties in comparison to plain wood.

The commercialization activities of several companies actually engaged in the production of wood-plastics are shown, including the actual making of the material. Parquet flooring applications are highlighted, with emphasis on furniture and other industrial uses.

ATOMIC REVOLUTION IN WOOD

0418

ATOMS IN THE MARKETPLACE: NUCLEAR MATERIALS SAFEGUARDS AND MANAGEMENT (1968). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Office of Information Services, USAEC. For sale by NAC.

Deals with the economic nature and significance of high cost, strategic nuclear materials—with their importance to commerce, the nation and the nations of the world.

The film discusses the great need for safeguards and controls to avoid the diversion of uranium, plutonium and other nuclear materials into channels for the making of unauthorized nuclear weapons. In addition, as the young, dynamic nuclear industry grows it will, eventually assume ownership of all commercial nuclear materials, and cannot risk small cumulative, undetected losses and the resultant serious financial problems. The film details how the U. S. manages nuclear materials and the special techniques and methods involved—practices established by the U. S. Atomic Energy Commission, by private industry, by nations throughout the world, and international organizations—a story that demonstrates the interrelationship of sound management and nuclear safeguards in the atomic age.

0092

CLEAN AIR IS A BREEZE: Airborne Contamination Control Through Laminar Air Flow (1965). 16 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Sandia Corporation for the USAEC. For sale by NAC.

Common sources of airborne contamination are illustrated to show that our world is contaminated by a variety of airborne particles. The difficulties of manufacturing precision devices in such a "dirty" world are shown. The tiny sizes of particles which cause problems in delicate assembly work and critical industrial processes are illustrated through animated photography. Earlier attempts to clean air for industrial processes by means of clean rooms are shown. The reasons for less than complete success with standard clean rooms are explained through animation, and the theory and basic operating principles of laminar airflow systems are shown. The variety of laminar airflow devices (various clean rooms and clean benches) now available is shown. Application of such devices to industrial processes, research and development problems, and to the field of medical care and medical research are illustrated.

ORDER BY FILM NUMBER AND TITLE

0127

FARM FRESH TO YOU (1966). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the Army Pictorial Center. For sale by NAC.

Preservation of fresh fruits and vegetables by radiation pasteurization is described in this semi-technical film. After touching briefly on the high spoilage losses presently encountered

FARM FRESH TO YOU

in the marketing of fresh produce, the film presents graphic visual evidence of the reduced spoilage and extension of shelf life which can be obtained through the use of nuclear energy. The process of exposing foods to the energy of the atom in radiation research facilities is described, together with a simple animated version of what happens during exposure. Emphasis is placed on the fact that foods processed in this way are safe for human consumption, and that each radiation pasteurized food item will be approved by the U. S. Food and Drug Administration before it is offered for sale to the public.

HONORS: 5th ANZAAS International Scientific Film Exhibition, Australia and New Zealand; 5th International Festival of Science Films, Lyon, France; 12th International Festival of Scientific & Educational Films, Padua, Italy; 14th International Nuclear Exposition, Rome, Italy; 5th International Festival of Science Fiction Films, Trieste, Italy; 7th International Agricultural Film Festival, Trieste, Italy; 10th Gold Mercury Film Prize, Venice, Italy.

0138

THE FRESHER THE BETTER (1966). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the Army Pictorial Center. For sale by NAC.

Preservation of fresh seafoods by radiation pasteurization, to extend refrigerated shelf life up to three times that of unirradiated fresh seafood, is described in this semi-technical film. The concept of using energy from atomic particles to kill or destroy microorganisms and other food spoilage bacteria is described in animated form, followed by sequences of actual research being performed. The Marine Products Development Irradiator, a semi-commercial scale food irradiation facility, is shown as products are being processed. The purpose of the film is to introduce the concept of radiation preservation of food, and to explain the process and its results. Emphasis is placed on the fact that foods processed in this way are safe for human consumption, and that each radiation pasteurized food item will be approved by the U. S. Food and Drug Administration before it is offered for sale to the public.

HONORS: 5th International Festival of Science Films, Lyon, France; 10th International Festival of Scientific & Educational Films, Padua, Italy; 10th Gold Mercury Film Prize, Venice, Italy.

GUARDIAN OF THE ATOM . . . . See page 20.

0175

THE INDUSTRIAL ATOM (1956). 12½ minutes, black and white.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Shows the early use of radioisotopes to detect hidden leaks, locate stuck scrapers in oil pipelines, and for piston ring wear studies to test quality of lubricating oils.

THE MIGHTY ATOM . . . . . See page 21.

NUCLEAR INNOVATIONS IN PROCESS CONTROL . . . . . See page 44.

THE NUCLEAR WITNESS

0233

THE NUCLEAR WITNESS: ACTIVATION ANALYSIS IN CRIME INVESTIGATION (1966). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by General Dynamics Corporation for the USAEC. For sale by McNamara Productions.

Describes a new technique in the examination of physical evidence involved in crime investigation called "Activation Analysis." This method is some 100 to 1,000 times more powerful (more sensitive) for the detection of most elements than methods currently available in the usual crime laboratory. Evidence-samples too small to be analyzed by other methods (even microscopic samples) can often be analyzed successfully by this new technique, and tell-tale bare trace concentrations can be measured. Frequently, the analysis can be done nondestructively—thus preserving the samples.

This highly sensitive and powerful analytical technique is a method of analyzing samples for various elements by bombarding them with neutrons, to make some of the elements radioactive, and then identifying and measuring the induced radioactivities to complete the quantitative analysis.

The film shows the application of activation analysis to the investigation of several illustrative types of criminal cases; murder, burglary, and narcotics peddling. The cases described are based on actual cases. One case is described all the way from the commission of the crime through the trial in court; the others from the crime through the laboratory investigation. The film is of interest to law enforcement people, the legal profession, service organizations and educated laymen.

HONORS: 14th Annual Columbus Film Festival, Ohio; 10th International Exhibition of the Scientific—Didactic Film, Padua, Italy.

0250

OPPORTUNITY UNLIMITED: FRIENDLY ATOMS IN INDUSTRY (1962). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the U. S. Army Pictorial Center for USAEC. For sale by NAC.

This film, narrated by news commentator John Daly, surveys the widespread use of radioisotopes by American industry to make better products—from ships to nylon hose—more efficiently and with an impressive record of safety. By means of animation and live action, the film explains what radioisotopes are and how they are used to (1) measure and control the thickness of sheet materials, (2) measure densities of materials, (3) control product quality, (4) increase flexibility and mobility of industrial radiography (taking X-ray type pictures to assure safe construction), and (5) act as tracers to follow physical movement and chemical reactions. Examples are given of thickness gauges of nylon cord-rubber ply for automobile tires, sheet plastic, and cord-rolled alloy sheets for computers and space-age instruments, as well as examples of gauges which measure densities without shutdown (such as

gauges that measure sugar content in applesauce, fat content, and moisture content in soil) and which measure the level of liquids in cans. Industrial radiography with radioisotopes is illustrated with the work on submarines.

RADIATION PROCESSING: A NEW INDUSTRY
. . . . . See page 45.

RADIOISOTOPES: SAFE SERVANTS OF INDUSTRY
. . . . . See page 45.

ROUNDUP
. . . . . See page 3.

0333
SANDIA SPINOFF (1967). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Sandia Laboratory. For sale by NAC.

Demonstrates how high reliability requirements in the U. S. nuclear weapons program have resulted in scientific developments at USAEC's Sandia Laboratory which have peaceful-"spinoff" applications for hospitals, industry, etc. Examples shown: laminar air flow, a technique which creates ultra-clean environments for any medical or industrial application where protection is needed from airborne contamination; ion plating, a new method of plating which creates extremely tight bonds between previously incompatible metals; and ACCEL (Automated Circuit Card Etching Layout). See ACCEL REVISITED, page 40.

HONORS: CINE Golden Eagle International Award, Washington, D. C.; One of the "Most Honored Pictures of the Year," 1967, Business Screen, Chicago.

TRIP STEEL
. . . . . See page 43.

INTERNATIONAL

0066
ATOMS FOR THE AMERICAS (1963). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for USAEC by Orleans Film Productions. For sale by NAC.

Offers an extensive tour of the facilities of the Puerto Rico Nuclear Center (operated for the USAEC by the University of Puerto Rico) and a study of the Center's curricula and research programs. The Center was conceived primarily to aid the Latin American nations in developing skills essential to nuclear energy activity, by providing graduate- and post-graduate-level education and research opportunities. At the Center's Bio-Medical building, work is shown involving radioisotopes and their clinical applications, and other nuclear work related to biology, chemistry, and medicine is reviewed. Study and research in nuclear engineering and technology, health physics, agriculture and marine biology are shown at the Center's reactor and laboratories located on the campus of the University of Puerto Rico's College of Agriculture and Engineering, and aboard the Center's oceanographic ship.

ORDER BY FILM NUMBER AND TITLE

ATOMS IN THE MARKETPLACE . . See page 10.

MEDICINE

0060
THE ATOM IN THE HOSPITAL (1961). 12½ minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

At the City of Hope Medical Center, the following facilities are shown: (1) the stationary cobalt source that uses radioactive cobalt to treat various forms of malignancies; (2) a rotational therapy unit called the "cesium ring," which revolves around the patient and focuses its beam on the diseased area; and (3) the total-body irradiation chamber for studying the effects of radiation on living things. Studies can be carried out to determine the effects

of doses of radiation. Data from these studies will be used for civil defense purposes, for investigating skin grafts and organ transplants, etc. At the UCLA Medical Center the total-body counter facility, which measures the slight radioactivity normally present in the animal or human body, is shown. The counting facility makes it possible to employ new diagnostic procedures requiring much smaller amounts of radioactive materials by eliminating practically all background radiation.

0424

ATOMIC MEDICINE (1968). 27 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by CBS-News for the series, "The 21st Century." For sale by McGraw Hill Films. NOT cleared for television.

Makes a summary examination of the expanding applications of atomic energy for the diagnosis and treatment of disease today and in the future, with Host-Narrator Walter Cronkite. Radioisotopes are explained. By using the right radioisotope, doctors can determine the condition of organs, diagnose illness and often treat disease. We see a patient take an "atomic cocktail" (radioactive iodine) which destroys diseased tissue in the thyroid. An example is shown of research on treating leukemia in which the patient's blood is circulated and irradiated outside the patient's body. We see a patient's cancerous pituitary gland being "stabbed" with a needle of radioactive strontium-90, which burns out the cancer.

BROOKHAVEN SPECTRUM
. . . . . See page 14.

ATOMIC MEDICINE

A BEGINNING WITHOUT END

DIAGNOSIS AND THERAPY WITH RADIATION
. . . . . See page 45.

DOORWAY TO DIAGNOSIS
. . . . . See page 45.

THE RADIOISOTOPE POWERED CARDIAC PACEMAKER
. . . . . See page 47.

0304

RADIOISOTOPE SCANNING IN MEDICINE (1965). 16 minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Development of scanning equipment in combination with new radioactive drugs has produced important advances in medical diagnosis. Radioactive tracers give off signals that can be converted into an image. Administered to patients, these radioactive materials, in effect, make pictures revealing valuable information about the size, shape, position and functioning of lungs, thyroid glands, bones, liver, kidneys, heart, spleen, and brain. The signals emitted from the organ-selective atomic tracers are registered by a scintillation detector which moves over the test area on the patient. This motion picture explains the methods of organ scanning, and gives examples: thyroid and lung scanning with radioactive iodine. Scans are also shown of the chest, brain, liver, and kidneys. Visualization of the malfunctioning of human organs is produced in black and white or in color on paper and/or on photographic film. The radiation detection and printout devices are described.

SHORT-LIVED RADIOISOTOPES IN NUCLEAR MEDICINE
. . . . . See page 47.

OAK RIDGE NATIONAL LABORATORY AND ITS SCIENTIFIC ACTIVITIES
. . . . . See page 15.

ZONAL ULTRACENTRIFUGE
. . . . . See page 48.

NATIONAL LABORATORY ACTIVITIES

0414

A BEGINNING WITHOUT END (1968). 30 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Summary of the wide variety of nuclear research and development work at the Berkeley and Livermore sites of the USAEC's Lawrence Radiation Laboratory, operated by the University of California. The film briefly covers, in turn: the work of the late Dr. Ernest Lawrence on the invention and development of the cyclotron (particle accelerators); a historical statement by Dr. Lawrence on the principles of the cyclotron; the post-war work using particle accelerators to discover new elements; research into photosynthesis; use of high-energy particles from an accelerator for medical therapy; studies in superconductivity—the transmission of electricity with no production of heat; studies of chemical processes that occur during a nuclear explosion; work on the Plowshare program; studies of effects of radiation on animals, man and the food cycle of both; developments in the Sherwood program—development of controlled thermonuclear process for useful energy; high energy physics work with the Bevatron.

HONORS: Two Statuettes, Industrial Photography; Special Trophy, Industrial Management Film Festival.

0083

BROOKHAVEN SPECTRUM (1967). 25 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Brookhaven National Laboratory. For sale by Owen Murphy Productions, Inc.

Surveys some of the varied aspects of nuclear research and engineering at the Brookhaven National Laboratory. Scientists and technicians are seen conducting experiments in biology, chemistry, medicine, physics and reactor technology. The use and operation of such large and complex facilities as reactors and accelerators are shown in studying the fundamental structure of matter and the forces within the atomic nucleus. Yet in spite of the impressive size and complexity of their tools, the film concentrates upon the men and women themselves who are the most vital component of any scientific investigation.

Among the research projects reviewed: preservation of perishable foods with high intensity radiation; autoradiography of rare oil paintings by neutron activation; studies with radiation on the mechanisms of aging; an experiment, in cooperation with

BROOKHAVEN SPECTRUM

NASA, on the combined effects of weightlessness and radiation on living organisms in outer space; a newly developed treatment for leukemic patients by extracorporeal irradiation of the blood; an experiment at the 33-BEV AGS resulting in the discovery of an important subnuclear particle; and the use of neutron spectrometers at the High Flux Beam Research Reactor in studying the structure of liquids and solids.

The film suggests the many lines of research that lie ahead. While the primary aim of such research, basic in itself, is to add to man's knowledge of his physical world, it is eventually applied to his benefit in a more direct sense.

HONORS: EFLA American Film Festival, New York City, N. Y.; 10th CINE Golden Eagle International Award, Washington, D. C.; Special Merit, 6th International Labour & Industrial Film Triennial, Antwerp, Belgium; 4th International Exhibition of the Scientific Film, São Paulo, Brazil; 5th International Festival of Scientific & Technical Films, Buenos Aires, Argentina; Trieste Festival of Films, Italy; Scientific Film Festival, Lyon, France; 12th International Festival of Scientific and Educational Films, Padua, Italy; 10th Gold Mercury Film Prize, Venice, Italy; 18th International Exhibition of the Documentary Film, Venice, Italy; 9th International Documentary Festival, Bilbao, Spain; 13th International Congress, Rome, Italy; Award of Merit, 15th Annual Columbus Film Festival, Ohio; 5th International Festival of Scientific Films, Paris, France; One of the "Most Honored Pictures of the Year," 1967, Business Screen, Chicago; AAAS (American Association for the Advancement of Science) 1967 Convention; Citation, 5th Festival of Technical Films, Budapest, Hungary.

0201

THE MANY FACES OF ARGONNE (1963). 60 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Survey of the objectives, methods, and hardware of the broad range of nuclear research conducted by a typical national laboratory of the USAEC. With both artistry and clarity, the ANL narrator shows the CP-5 and the range of work accomplished with this powerful research reactor. In an ANL chemistry laboratory, investigation of atomic forces with "color center" studies of the structure of crystals is shown. Information is given on methods of protecting atomic scientists from radiation: film badges and dosimeters; the checking of air, water, walls, dust; the remote-control devices involving periscopes and television in order to see and work despite massive shielding.

Argonne's efforts in the power reactor field are summarized, using the Experimental Breeder Reactor II as an example, with detailed explanation of its components, purposes, methods. Experiments to learn the effects of radiation on human beings are explained— studies of the effects of radiation received continually over a lifetime (bone-tumor studies); studies of the mutation-producing effects of radiation (fruitfly studies, work with dogs, etc.); studies of neonatal rates; life-span studies; studies of leukemia; effects of radiation on cells.

Shows in detail the giant Zero Gradient Synchrotron accelerator —or "atom-smasher"—used to tear apart subatomic particles to study the basic nature of matter. Argonne's relation to American universities is outlined, with views of the training of foreign students.

0211

MIRACLE IN THE DESERT: THE STORY OF HANFORD (1966). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by J. L. Feierbacher. For sale by NAC.

Tells the story of the development during World War II of the Hanford Engineer Works in Southeastern Washington. Construction of the billion dollar plant was based on the discovery of the new element 94, plutonium, in California by Dr. Glenn T. Seaborg and others, in 1941, and on the demonstration of the first successful nuclear chain reaction in Chicago by Dr. Enrico Fermi and others, in 1942.

Starting with construction of the secret Hanford nuclear plant in 1943, additions and improvements were made to plant facilities in the post-war years in the creation of plutonium by transmutation of uranium atoms and its chemical separation from uranium. Also shown is the New Production Reactor, the nation's first dual-purpose reactor to produce plutonium for military needs and steam to generate electricity.

Hanford's broad research efforts in the fields of metallurgy, radiation effects, biology, aquatic biology, atmospheric physics and other peaceful uses of atomic energy are summarized. Conversion of the plant from military needs to work on peaceful uses of nuclear energy is detailed. An explanation is given of how community and government agencies cooperated to institute a multiple-contractor operation, attract new, diversified industry and create new jobs.

ORDER BY FILM NUMBER AND TITLE

0234

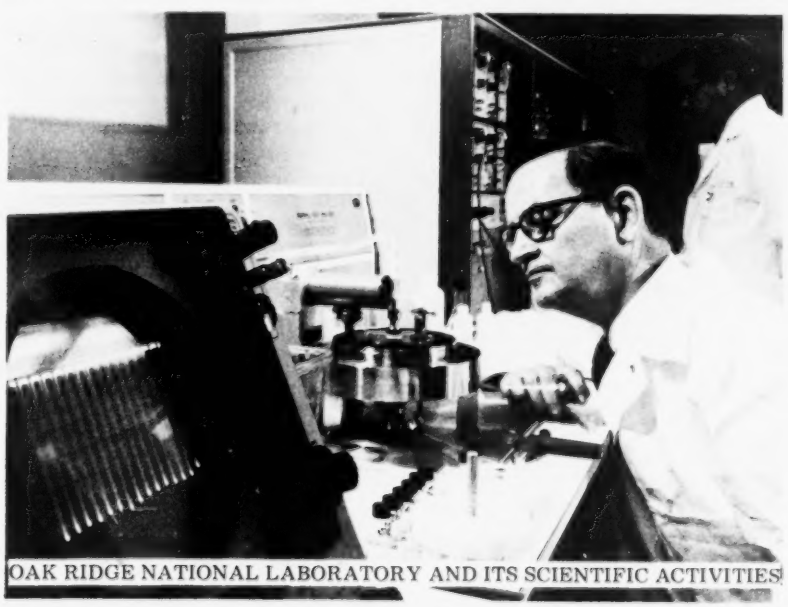
OAK RIDGE NATIONAL LABORATORY AND ITS SCIENTIFIC ACTIVITIES (1967). 17 minutes, color.

Suitable for Understanding Levels-2 and -3.

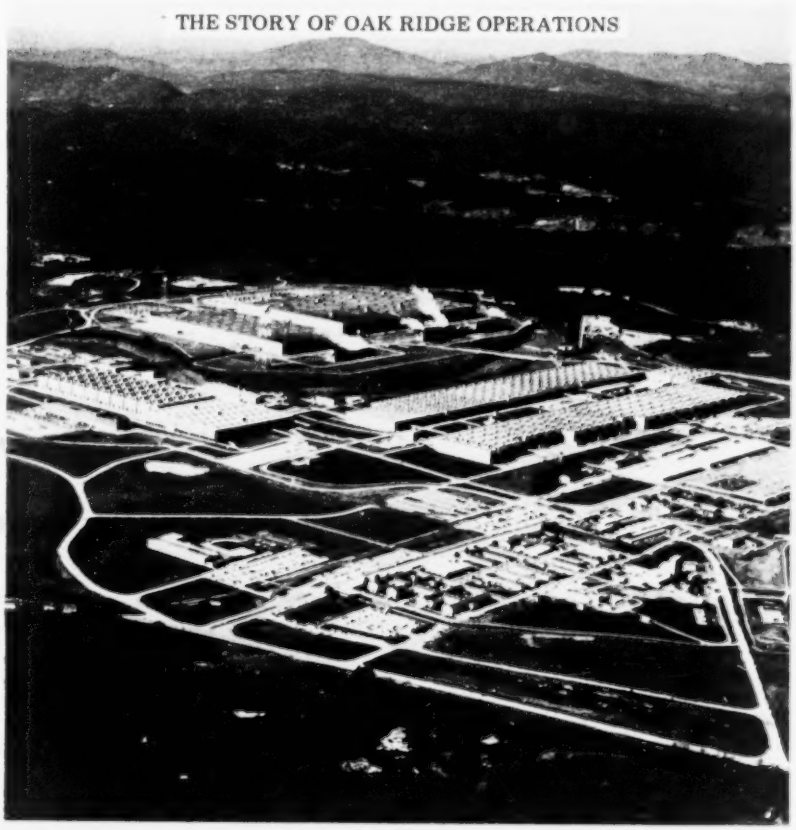
Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Shows the numerous and varied activities and facilities at USAEC's Oak Ridge National Laboratory, and touches on almost all of the Laboratory's activities involving nuclear research, fundamental and applied research in all fields of science, and research on the central technical problems of society.

Among the areas covered: breeder reactor research with the Molten Salt Reactor Experiment; reprocessing of reactor fuels; development of new reactor fuels; auxiliary power sources; criticality studies; reactor safety studies; waste disposal work; controlled thermonuclear research; desalting of water by nuclear reactor heat; effects of radiation on man and his environment; bio-medical research; radioisotope production; radioactive sources; the High Flux Isotope Reactor; and the Oak Ridge Isochronous Cyclotron.



OAK RIDGE NATIONAL LABORATORY AND ITS SCIENTIFIC ACTIVITIES



THE STORY OF OAK RIDGE OPERATIONS

OF MAN AND MATTER

. . . . . See page 26.

0444

THE STORY OF OAK RIDGE OPERATIONS (1971). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Oak Ridge Operations. For sale by NAC.

The breadth and scope of the Nation's atomic energy program—from the synthesis of minute quantities of man-made elements for special research to the highly automated production of tons of enriched uranium for fueling nuclear power plants—are embodied in the programs of the Atomic Energy Commission's Oak Ridge Operations. As one of the AEC's largest and most diverse field offices, Oak Ridge Opera-

tions is responsible for the work of plants and laboratories in four states and Puerto Rico which employ some 20,000 persons in programs of nuclear research and production.

In nontechnical language, the film covers the major activities of Oak Ridge Operations which support programs of national defense and the peaceful applications of atomic energy. A major segment of the film explains how three gaseous diffusion plants are meeting the demand for enriched uranium to fuel nuclear power plants in this country and abroad; the process of gaseous diffusion is explained and methods of increasing production capacity are also presented. Research activities of the Oak Ridge National Laboratory are highlighted, including a major experimental effort to control the thermonuclear reaction which could lead to the development of fusion reactors, and studies on the environment. The use of radiation to diagnose and treat disease in a unique Oak Ridge hospital is covered. Also receiving attention are the nuclear-related studies of the Agricultural Research Laboratory in Oak Ridge and the research and education programs carried out by the Puerto Rico Nuclear Center.

NUCLEAR DESALTING

0463

THE BITTER AND THE SWEET (1971). 29½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

In the world today there are more than 700 small capacity desalting plants which produce about 350 million gallons of freshwater every day. All of these plants use conventional sources of power such as coal, oil or gas to drive their conversion systems. If Man is to meet the growing demand for more and more desalted water, he must eventually turn to nuclear energy as his cheapest source of power.

All aspects of desalting technology are discussed in this film, as well as a capsule report on the status of commercial desalting in the Western Hemisphere. The film blueprints the Agro-Industrial Complex idea and endorses the belief that the technologies of desalting and nuclear energy must converge, if Man is to turn back the threatening growth of world poverty and starvation.

HONORS: 9th ANZAAS International Scientific Film Exhibition (Association for the Advancement of Science), Australia and New Zealand; Chris Award, 19th Columbus Film Festival, Columbus, Ohio.

0407

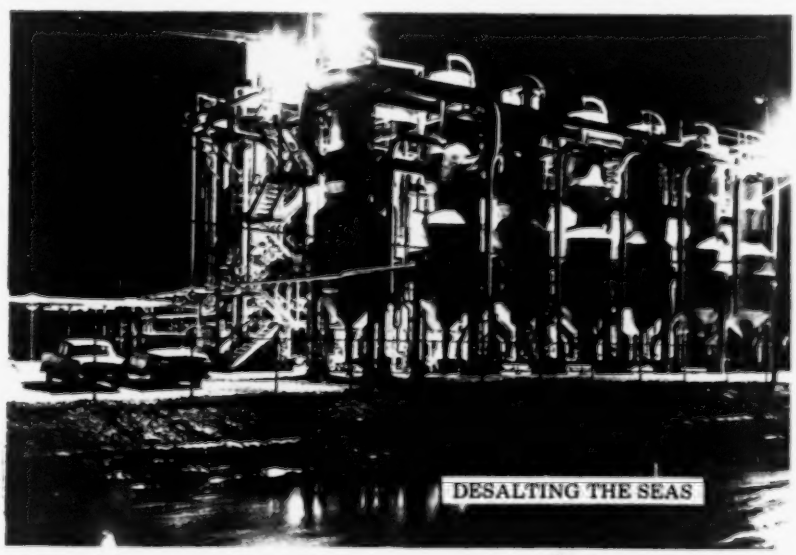
DESALTING THE SEAS (1967). 17 minutes, color.

Suitable for Understanding Levels-2 and 3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Describes the various methods of purifying saline waters through the use of nuclear energy, with particular emphasis on large-scale dual purpose nuclear-electric desalting plants which will not only purify water but will also produce large amounts of electric power simultaneously. The film deals with, in turn: the growing shortage of water in a famine-threatened world of expanding population; the various methods of desalting sea water—the crystallization or freezing process, the membrane or squeezing process, the distillation or boiling process; an explanation of nuclear energy as a means of desalting large quantities of sea water; cost reduction by means of dual-purpose nuclear plants; the problems and goals of nuclear desalting and the development of plants to advance the technology.

HONORS: Special Mention, 21st Film Festival, Salerno, Italy; 5th International Festival of Scientific and Technical Films, University of Buenos Aires, Argentina; 15th International Nuclear Congress, Rome, Italy, U. S. Trade Center, London, United Kingdom; 5th International Scientific Film Festival, Lyon, France; 12th International Festival of Scientific and Educational Films, Padua, Italy; 5th International Festival of Scientific Films, Paris, France.



0440

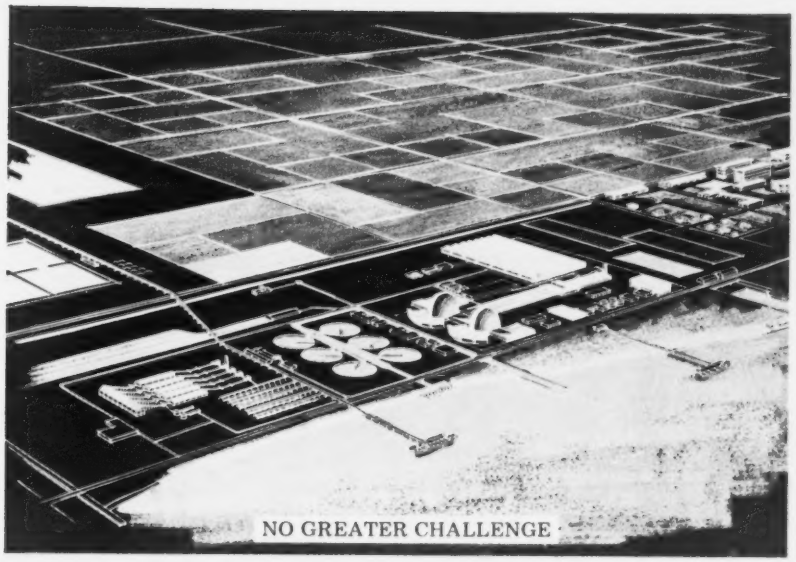
NO GREATER CHALLENGE (1969). 14 minutes, color.

Suitable for Understanding Levels-2 and 3.

Produced by Starbecker Inc. for the USAEC. For sale by NAC.

Shows man's historic and growing hunger for water and a dramatic solution to this great challenge—the Agro-Industrial Complex. With the nuclear reactor as the energy source, and the desalting plant as the fresh water source, tomorrow's coastal deserts may be transformed into self-sustaining, mammoth nuclear powered agro-industrial centers consisting of farms and industrial plants. Nuclear power reactors will pump millions of gallons of water from the sea and provide the heat to desalt it. At the same time low-cost nuclear energy will produce electricity to help extract and process the ocean's mineral wealth. Electricity from nuclear energy will power plants that produce fertilizers. Fertilizers and fresh, desalted water for irrigation will enrich lands where no crops have grown for centuries. Designed to convert waste lands into new lands of desert agriculture and to provide new industries and new jobs, the proposed Agro-industrial complex will raise the standard of living for millions of people.

HONORS: First Place, U. S. Industrial Film Festival, Chicago; 16th Interna-



NO GREATER CHALLENGE

tional Nuclear Congress, Rome, Italy; Israel International Film Festival, Tel Aviv; 70th International Convention in Electrical Engineering, New York City, N. Y.; 7th International Festival of Short Films, Crakon, Poland.

ORDER BY FILM NUMBER AND TITLE

NUCLEAR WEAPONS AND TESTING

0113
ENVIRONMENTAL TESTING AT SANDIA (1964). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Sandia Corporation for the USAEC. For sale by NAC.

Discusses the environments, both natural and induced, which weapon components and systems may experience between manufacture and use. The film shows how environmental testing is used to ensure reliability. A series of test sequences enables the audience to see some of the facilities at USAEC's Sandia Laboratory—giant centrifuge, electrodynamic shaker, rocker sled, air gun and climatic chamber —which are used to produce varying environments.

0248
OPERATION LONG SHOT (1966). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the Defense Atomic Support Agency of the Department of Defense by the U. S. Air Force. For sale by NAC.

Reports on an Advanced Research Project Agency (ARPA) experiment of the Vela Uniform series executed by the Defense Atomic Support Agency (DASA), with the support of the Department of the Interior and the USAEC. Operation Long Shot, an underground nuclear test in the fall of 1965, was conducted on Amchitka, close to the western end of the Aleutian Islands.

The objective of Vela Uniform is to increase the capability to detect, identify and locate underground nuclear detonations at intercontinental ranges. The primary objective of Long Shot was to investigate possible travel-time anomalies associated with seismic events occurring in island-arc structures. Such anomalies could seriously affect the accuracy of locations made by long range seismic measurements. Another objective was to compare the seismic signatures of man-made versus natural events (earthquakes) occurring in such complex geologic structures.

The film gives details on core drilling, methods to assure safe containment, nature of the rock, lowering of the casing, lowering of the nuclear device, stemming operations, seismic instruments in the close-in monitoring program, the long-range seismic measurement program in Alaska, Canada, the United States and elsewhere in the world, the detonation, and measurements and results.

0286
PROJECT SHOAL (1964). 17½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC. For sale by NAC.

Describes the preparation for, and firing of, an underground nuclear detonation, one of a planned series of experiments in a Department of Defense research program conducted with USAEC participation. The purpose of the experiments is to improve means of detecting, locating, and identifying underground nuclear explosions. The Project Shoal detonation on October 26, 1963, with an explosive force equal to about 12,000 tons of TNT, was intentionally located in an area subject to natural earthquakes, 28 miles from Fallon, Nevada, to gain information to help distinguish between earthquakes and underground tests. Technical direction for Shoal was by the Sandia Laboratory under the overall management of the USAEC's Nevada Operations Office. The film describes: selection of the site, pre-shot preparations—including a comprehensive program to ensure public safety and to inform the citizens of Fallon of the proposed shot —various citizens' and city officials' reactions to the test, the seismic station program, instrumentation, and the detonation and some of its valuable results.

RETURN TO BIKINI

. . . . . See page 2.

0384
UNDERGROUND NUCLEAR WEAPONS TESTING (1967). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the USAEC. For sale by NAC.

Explains the responsibility of the USAEC to test nuclear weapons—work vital to the U. S. national interest and the defense capabilities of the Free World. The film shows how weapons tests at the Nevada Test Site (in central Nevada and on Amchitka Island in the Aleutian chain) are carried out safely underground in a manner designed to contain radioactivity within the ground, within the framework of the limited test ban treaty.

The film explains various types of nuclear tests: developmental—to check out concepts of weapons design; proof tests—to confirm safety and design of weapons going into production; checks on the readiness of weapons in the stockpile; and, in cooperation with the Department of Defense, tests to obtain information on effects from nuclear explosions.

UNDERGROUND NUCLEAR WEAPONS TESTING

The film discusses and illustrates: how proposals for development tests of nuclear devices are brought into being; the various steps in evaluating and approving proposals; the facilities at the main test areas—remote Frenchman and Yucca Flats and the isolated Pahute Mesa; the setup at CP-1—the Control Point and nerve center for operations.

The film shows: techniques for the drilled vertical shafts; the complex instrumentation; lowering of the nuclear device into the shaft; backfilling of shafts; scenes at the Control Point, where the complex timing and firing systems are located; the careful weather briefings and other stringent safeguards to assure public safety; monitoring techniques, air sampling, assay of water and vegetation, aerial sweeps. We watch the progress of a typical test with animation to illustrate what has happened underground.

ORDER BY FILM NUMBER AND TITLE

PEACEFUL NUCLEAR EXPLOSIVES

0445

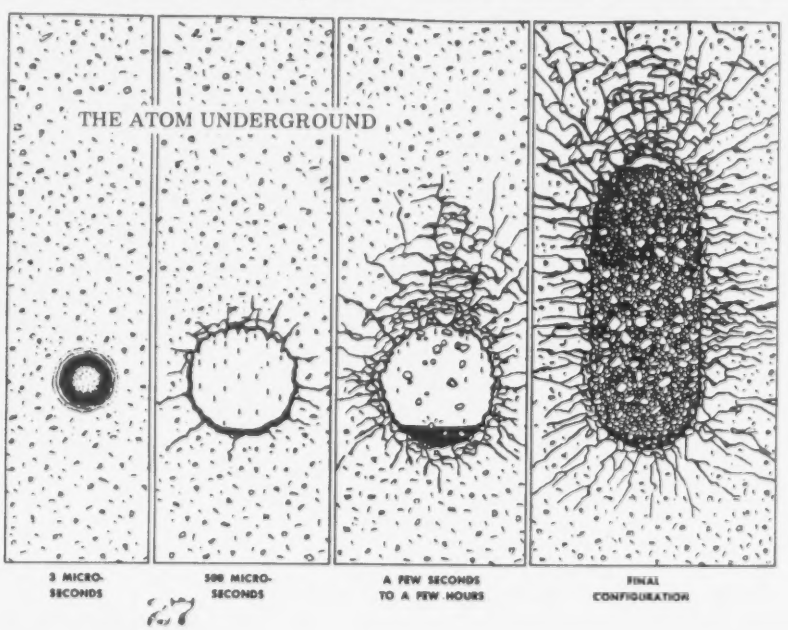
THE ATOM UNDERGROUND (1969). 20 minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Is the story of a new, effective way for man to recover valuable natural resources locked deep beneath the surface of the earth. Using the explosive power of the atom in a method called underground engineering, the USAEC and private industry are developing and investigating the feasibility of the following "Plowshare" techniques illustrated in the film—techniques to: stimulate the flow and production of natural gas; increase oil reserves and improve the flow of oil through oil-bearing rock formations; provide underground storage areas for gas, oil, water or wastes; in-place recovery of oil from oil shale; "mine" copper and other minerals by underground leaching; and produce new elements and isotopes. The film compares the very attractive economics of nuclear explosives with the comparatively high costs of conventional high explosives. Enormous energy, compact and easily transportable, relatively inexpensive, and safely applicable—this is the new power tool that "Plowshare's" peaceful atom could add to man's resources, to do jobs never before economically practical or even possible.

ORDER BY FILM NUMBER AND TITLE



OAK RIDGE NATIONAL LABORATORY AND ITS SCIENTIFIC ACTIVITIES
. . . . . See page 15.

0415
PROJECT GASBUGGY: THE RESOURCEFUL ATOM (1968). 14¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC and El Paso Natural Gas Company. For sale by NAC.

Man's hope to harness the atom's explosive force for peaceful purposes moved closer to fulfillment deep beneath a plateau in northern New Mexico in December 1967. Government and industry joined forces to study whether nuclear explosions can be safely used to perform massive underground engineering tasks for more efficient recovery of natural resources.

The experiment involved the detonation of a 26-kiloton nuclear explosive (energy equivalent to that released by 26,000 tons of TNT) 4,240 feet underground in a known area of natural gas-bearing sandstone in which the gas is so tightly trapped that recovery by conventional techniques is uneconomic. Principal objective of the experiment was to investigate if the explosive force of the atom could crush and shatter the rock to permit safe and economic recovery of the natural gas.

PROJECT GASBUGGY reports on site preparations, drilling activities, emplacement of the nuclear explosive, installation of safety monitoring equipment, the explosion and drilling back to collect gas and rock samples. Art and animation are used to illustrate the test objectives, what takes place underground when a nuclear explosive is fired, and the expected effects of the explosion on the gas reservoir.

HONORS: 6th Review of Scientific, Technical & Educational Films, Pardubice, Czechoslovakia; 4th International Exhibition of the Scientific Film, São Paulo, Brazil; 5th World Festival of Scientific Education & Geographical Films, Teheran, Iran; 13th International Festival of Scientific & Educational Films, Padua, Italy; Scientific Film Festival, Lyon, France; 6th International Exhibition of the Scientific Film, Buenos Aires, Argentina.

ORDER BY FILM NUMBER AND TITLE

TO DEVELOP PEACEFUL APPLICATIONS FOR NUCLEAR EXPLOSIVES
. . . . . See page 49.

PEACEFUL USES (SUMMARY FILMS)

0439
THE ATOM: YEAR OF PURPOSE (1969). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC and Argonne National Laboratory. For sale by NAC.

Describes 17 major developments in the peaceful uses of the atom as well as six spin-offs. The major stories include: the first refueling of the Nuclear Ship *Savannah* in six years, the growth of nuclear power stations, Experimental Breeder Reactor II, the Agro-Industrial Complex (nuclear reactors to desalt seawater for coastal-desert agriculture and to produce electricity for factories), toll enrichment of uranium owned by private industry, expanded mining of uranium, work on the giant 200 BEV "atom smasher" at the National Accelerator Laboratory with its 12-foot bubble chamber and superconducting magnet, Project Buggy and Project Gasbuggy (for the peaceful applications of nuclear explosives: large-scale excavation and natural gas stimulation), and Phoebus-2A full-power ground test of nuclear powered space rocket engine. Among the spin-off stories are: transplanting of sea otters in the Aleutians, terradynamics (ground penetration studies), a stronger TRIP steel, and the zonal centrifuge (for ultra-pure vaccines).

HONORS: Citation, 5th Festival of Technical Films, Budapest, Hungary.

0448
ATOMIC SEARCH (1970). 29 minutes, color.

Suitable for Understanding Levels-2 and 3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

In laboratories across the nation, scientists in 1969 made continuing important contributions to the peaceful uses of nuclear energy. This film is the story of some of these achievements: nuclear chemistry used to investigate the composition of lunar rocks to help determine the age of the moon; a container of radioactive plutonium to provide heat to protect the seismometer on the moon during the cold lunar nights; an isotopic nuclear generator providing electrical power on weather satellites orbiting in space; the first in a series of tests with dogs of a nuclear-fueled cardiac pacemaker, a device to assist a damaged heart; development of new, highly-sensitive diagnostic tools to identify and separate the constituents in the body fluids to predict illness or disease; a special shielded room for low-dose total body irradiation, seeking a more effective, safer method of treating blood disorders; neutron activation analysis to measure the curative powers of a new drug treatment for the Parkinson syndrome, a nerve disorder; development of an irradiated concrete-plastic combination—a corrosion-resistant concrete-polymer four times stronger than ordinary cement; use of a similar irradiated wood-plastic combination, highly resistant to wear, for floors in public buildings and homes; a so-called solar telescope, almost a mile underground, that captures sub-atomic particles from the sun in order to learn more about solar energy; Project Rulison—a 40-kiloton nuclear explosion experiment to shake loose billions of cubic feet of natural gas trapped in hard rock more than 8,000 feet underground; positive identification of a new element, number 104, by a team of scientists at AEC's Berkeley Laboratory at the University of California; the work to learn more about effects of an expanding nuclear power industry on the environment—for example, the effects on fish of the excess heat water from reactor opera-

tion—as part of AEC's conscientious research to protect man and his environment.

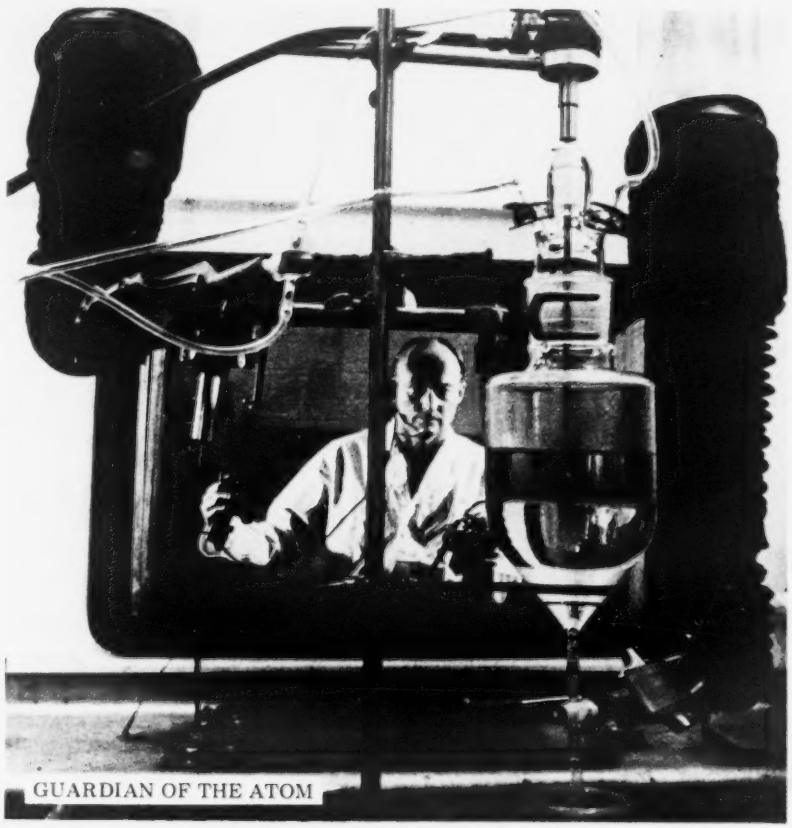
HONORS: 1970 Electrotechnical Film Exhibition, Budapest, Hungary; 2nd International Scientific Film Festival, Rio de Janeiro, Brazil; 8th International Science Fiction Film Festival, Trieste, Italy; 1970 National Youth Conference on the Atom, Chicago, Illinois; 1970–71 Industrial College of the Armed Forces, National Security Seminar, 7 U. S. cities; 17th International Nuclear Congress, Rome, Italy; 12th International Festival of Documentary Films, Bilboa, Spain; 15th International Festival of Scientific and Educational Films, Padua, Italy.

0112
GUARDIAN OF THE ATOM (1967). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Office of Information Services, USAEC. For sale by Motion Picture Service, U. S. Department of Agriculture.

States briefly the organization and role of USAEC and its national laboratories, and responsibilities in developing the peaceful uses and national security uses of the atom. Then, point by point, we learn of each type of



GUARDIAN OF THE ATOM

ATOMIC SEARCH

nuclear application and its effect on science and technology: the raw materials of atomic energy; the role of the three gaseous diffusion plants; the work to produce plutonium. the development and underground testing of nuclear weapons under the terms of the limited nuclear test ban treaty; the Plowshare program to develop peaceful uses of nuclear explosives; production of nuclear fuel for atomic reactors; building nuclear power plants; the use of nuclear power to propel surface ships and submarines; development work on the nuclear rocket for future space exploration; the production of radioisotopes, and their applications for medical diagnosis and therapy, in agriculture, industry, food pasteurization and the development of an improved wood; radioisotopes to operate the equipment at isolated weather stations, for buoys and lighthouses, and in satellites circling the earth; the work with giant atom smashers to study the basic nature of matter; research into the fusion of atoms to achieve almost unlimited power; the sharing of technical information.

HONORS: 11th CINE Golden Eagle International Award, Washington, D. C.; 5th World Festival of Scientific Education & Geographical Films, Teheran, Iran; 19th International Exhibition of Documentary Films, Venice, Italy; International Congress of Physiological Sciences, Washington, D. C.; U. S. Trade Center, London, United Kingdom; Scientific Film Festival, Lyon, France; Canadian National Exhibition, Toronto; 16th International Electronic & Nuclear Congress, Rome, Italy; Industrial College of the Armed Forces, National Security Seminars, 7 U. S. cities.

ORDER BY FILM NUMBER AND TITLE

0199

MAN AND RADIATION (1963). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the Army Pictorial Center. For sale by NAC.

Discusses many aspects of radiation and offers a survey of their widespread beneficial applications in medicine, industry, agriculture, power, and research. A historical survey of the discovery of radiation is followed by an animated explanation of different types of radiation, including alpha, beta, and gamma. A brief explanation of radioisotopes and how they are produced is given, followed by scenes depicting some of their uses, including the use of Calcium-47 to diagnose bone cancer. The detection and study of radiation by sensitive instruments is explained. The study of radiation in the laboratory is demonstrated with work in photosynthesis using radiochromatography. Several important industrial uses of radiation are shown. The use of irradiation for prolonged food preservation, particularly of such highly perishable food as fresh fish and the production of a new material, a wood-plastic alloy, is also shown.

HONORS: 2nd International Festival of Red Cross & Health Films, Varna, Bulgaria; 12th International Nuclear Congress, Rome, Italy.

0200

MAN AND THE ATOM (1965). 59 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by National Educational Television, Inc. with the technical assistance of the USAEC. For sale by NAC.

Surveys the role of the USAEC in guiding and supporting the Nation's atomic energy programs. The film opens with a visit to the enlightened community of Buchanan, New York, site of Consolidated Edison's Indian Point atomic power station. Following a review of the atom's place in national defense, the film goes into the mining of uranium and processing into fissionable materials.

It then explores the broad role of the USAEC, briefly discussing the make-up of the Commission and showing an actual Commission meeting in session. The USAEC's responsibility in all facets of atomic safety is covered as the film shows the testing of a nuclear power source for a space satellite and the design and testing of a power reactor. The processing and storage of radioactive waste is discussed.

After reviewing some aspects of the peaceful uses of nuclear explosives, including Projects Sedan and Gnome, the film next turns to a survey of radioisotopes and their many applications in medicine, agriculture and food preservation.

0420

THE MIGHTY ATOM (1968). 27 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by CBS-News for the series, "The 21st Century." For sale by McGraw-Hill Films. NOT cleared for television.

Makes a summary examination of the peaceful uses of atomic energy today and in the future, with Host-Narrator

THE MIGHTY ATOM

Walter Cronkite. Touched upon briefly are: the need for nuclear power; the nuclear merchant ship, the N. S. *Savannah*; nuclear propulsion for space rockets; SNAP (nuclear) generators which supply power for remote unmanned weather station and off-shore oil rigs; use of the atom's energy to preserve foods by irradiation; nuclear medicine: the fight against cancer; nuclear-powered man-made hearts; the theory of atomic fission and the controlled nuclear reaction in a reactor; the burial of atomic wastes and research into the future; the theory and operation of giant accelerators to smash atoms and study their subatomic particles; breeder reactors, desalting plants, agro-centers, the controlled fusion reactor.

MIRACLE IN THE DESERT

. . . . . See page 14.

POWER REACTORS

0022

THE ATOM AND EVE (1966). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the Connecticut Yankee Atomic Power Company. For sale by Bay State Film Productions.

How nuclear power has come of age—and what 11 New England utility companies are doing to use nuclear power effectively. We are shown how electric power is an integral part of our life, and that electrical needs have grown (in New England alone) from 1,200,000 kilowatts in 1930 to

6,200,000 KW in the 1960s—with this kilowattage to triple in the 1980s.

Faced with this growing power need, 11 companies in New England formed the Connecticut Yankee Atomic Power Company to construct the Connecticut Yankee Atomic Power Plant at Haddam Neck, Connecticut, to generate a half-million kilowatts for the use of homes and industry in the six New England states. The company hopes to lower electrical costs to the consumer by the use of nuclear power.

In a light, pleasant and entertaining manner, we are introduced to Eve as a baby, then as a girl, and finally as a woman (who dances through the film)—in parallel to the growing needs of millions of Eves for more and more electricity. The film shows the great potential of economic nuclear power—and although New England is used as the example, the facts apply generally to the rest of the United States.

0050

ATOMIC POWER PRODUCTION (1964). 14 minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Opening with an explanation of the growing demand for electrical power, produced today primarily through hydro-electric means and the burning of fossil fuels (coal, gas, and oil), the film tells of the need for harnessing nuclear energy. With animation, an explanation is given of how the heat created by the controlled chain reaction of atomic fuel in a reactor is converted to electrical power. Several types of power reactors and their basic differences are discussed: the boiling water reactor, the pressurized water reactor, one using a liquid sodium coolant, and one using an organic coolart. The principle of the "breeder" reactor is explained and its importance stressed. The film also discusses the care and safety of design, construction, maintenance and operation of atomic power plants.

0410

ATOMIC POWER TODAY (Short Version, 1967). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Seneca Productions, Inc., for the USAEC and the Atomic Industrial Forum, Inc. For sale by NAC.

This abridged version of ATOMIC POWER TODAY: SERVICE WITH SAFETY (described below) was made especially for meetings, lectures and groups that require short films only.

The motion picture explains the growing need for electricity, contrasts conventional and nuclear generating technology, shows how a nuclear power plant is designed, built and operated for dependable service; describes the many safeguards, and explains the USAEC regulatory and licensing procedures.

The motion picture tells the story of central station atomic power plants and how they serve the country now and in the future. Starting with how electricity is produced from water power and fossil fuels, the film introduces atomic fuel as a vast new energy resource. The film shows atomic fuel being fabricated and put to work in a nuclear reactor to produce heat which will ultimately produce electricity.

ORDER BY FILM NUMBER AND TITLE

THE BITTER AND THE SWEET

. . . . . See page 16.

0051

ATOMIC POWER TODAY: SERVICE WITH SAFETY (1966). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the Atomic Industrial Forum, Inc., and the USAEC by Seneca Productions, Inc. For sale by NAC.

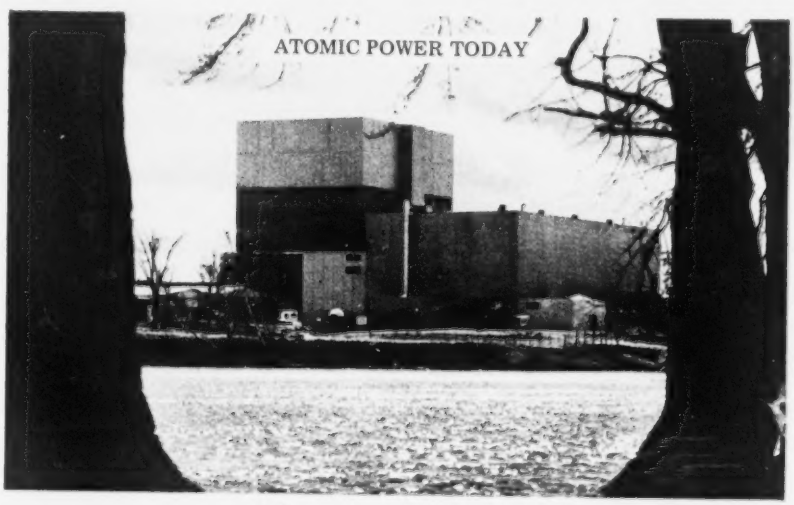
Tells the story of central station atomic power plants and how they serve the country now and will continue to do so in the future. Starting with basic information on how electricity is produced from water power and fossil fuels such as oil, gas and coal, the film introduces atomic fuel as a vast new energy resource that helps keep down the cost of electricity. The film shows atomic fuel being fabricated and, through animation, how it is put to work in a nuclear reactor to produce heat which will ultimately be used to produce electricity.

The safety aspects of atomic power, including both natural and engineered safeguards, as well as the demand for dependability by the operating utility and by the customer, are discussed. We see utility and USAEC conferences relating to a proposed atomic power plant and the care that goes into design and planning.

Further safety considerations are explored, showing some of the relevant equipment and systems. We learn why it is impossible for a nuclear reactor to blow up like an atomic bomb. The film also deals with the safe handling of wastes and controlled release of material to the environment on a planned basis, according to Federal safety regulations.

When the plant finally goes "on the line," it joins other atomic power plants across the nation providing dependable electricity for our many needs. We see a sampling of these plants and the communities they serve, demonstrating that atomic power is here today, providing for our present and future electrical power needs.

HONORS: 10th CINE Golden Eagle International Award, Washington, D. C.; One of the "Most Honored Pictures of the Year," 1967, Business Screen, Chicago; 4th International Festival of Scientific & Technical Films, Brussels, Belgium; 10th Gold Mercury Film Prize, Venice, Italy; 14th International Nuclear Congress, Rome, Italy; 8th International Industrial Film



Festival, Lisbon, Portugal; 5th ANZAAS International Exhibition of Science Films, Australia & New Zealand; 19th International Electronics & Communications Exhibit, Rome, Italy; 1970 Electrotechnical Film Exhibition, Budapest, Hungary.

ATOMIC VENTURE See page 53.

0074

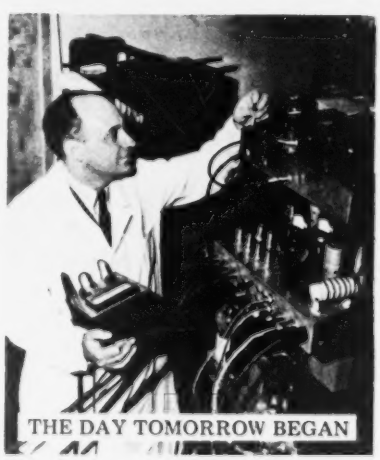
BASIC PRINCIPLES OF POWER REACTORS (1962). 8½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAF Audio Visual Center. For sale by NAC.

This is an excerpt from "The New Power," produced by the USAEC's Idaho Operations Office. This animated film, produced to facilitate the understanding of nuclear-power reactors and how they produce steam for the generation of electricity, briefly describes fission, controlled chain reaction, and the function of basic reactor components (e.g., core, reactor vessel, shielding, moderators, coolants, and control rods). The boiling-water and pressurized-water reactor concepts are explained. Various types of fuel elements are described, such as rods, plates, and pellets.

ORDER BY FILM NUMBER AND TITLE



0413

THE DAY TOMORROW BEGAN (1967). 30¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

This historical film tells the story of the building and testing of CP-1 (Chicago Pile-1), the first atomic pile, and the work of the brilliant scientific team, led by Dr. Enrico Fermi, which ushered in the Atomic Age behind a cloak of wartime security under the stands of Stagg Field, Chicago, December 2, 1942.

By interview, historical footage, paintings, etc., the film takes us on a step-by-step re-enactment of the famous event—beginning with the arrival of the first refugee scientists in 1939, to the dramatic hours in late 1942 when control rods were pulled out of CP-1 an inch at a time, to achieve the first sustained chain reaction.

Interviews are conducted with some of the members of the team and people closely associated with them—John Wheeler, Mrs. Laura Fermi, Glenn Seaborg, Leslie Groves, Frank Spedding, Crawford Greenewalt, Walter Zinn, Herbert Anderson, Norman Hilberry and Mrs. Leona Libby.

Against the background of a world plunged into World War II, the Third Reich hard on its way to developing an atomic bomb, uranium metal almost a laboratory curiosity, and with seemingly unsurmountable problems to be solved—the story of this brilliant scientific tour-de-force brings into focus the work of such people as Dr. Fermi, Leo Szilard, James Conant, Vannevar Bush, Arthur Compton, Ernest Lawrence and others.

DESALTING THE SEAS . . . . . See page 16.

ORDER BY FILM NUMBER AND TITLE

0454

IN SEARCH OF A CRITICAL MOMENT (1970). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

This artistic film tells the story of the ZPPR—the Zero Power Plutonium Reactor—a special split-table test reactor that is designed to supply information essential to the development of economic fast breeder central station nuclear power plants. Although most current reactors "burn" uranium, the trend is toward fast breeder reactors that will produce or "breed" more nuclear fuel (plutonium) than they consume, thus dramatically increasing the world's supply of fissionable material. But to achieve these goals, experimentation is necessary—resulting in machines to study the core designs of future breeder reactors. Animation shows the ZPPR, in which the composition, configuration and performance of fast breeder cores are tested. Criticality of the ZPPR is achieved by loading two separate "tables" with plutonium fuel and bringing them slowly together. The film shows the construction of the ZPPR by Argonne National Laboratory, its many safety features, plutonium handling and storage, the instrumentation and computer to record and analyze data obtained by the ZPPR, and the fuel loading and eventual attainment of the state of criticality of the ZPPR to prepare it for its important testing program.

HONORS: Gold Camera, 1970 U. S. Industrial Film Festival, Chicago, Illinois; 18th International Nuclear Congress, Rome, Italy.

0220

THE NEW POWER (1965). 45 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by USAF Audio Visual Center. For sale by NAC.

Tells how the National Reactor Testing Station in Idaho is furthering the USAEC's quest for economic nuclear power. Most of the more than 40 experimental nuclear reactors built, being built, or planned there are described either historically or currently, including the Navy's prototypes for the submarine *Nautilus* and aircraft carrier *Enterprise;* the internationally known testing reactor complex (MTR, ETR, ATR); the Idaho Chemical Processing Plant, the Army's mobile low power nuclear plant (ML-1); and the importance of breeding nuclear fuel as authorized by the two Experimental Breeder Reactor complexes, EBR-I and EBR-II. Also discussed are the USAEC's leading reactor safety programs—SPERT and STEP (Special Power Excursion Reactor Test and Safety Test Engineering Program). The film also explains the basic principles of power reactor construction and operation in an animated sequence that is also available as a separate film titled, BASIC PRINCIPLES OF POWER REACTORS described on this page.

NO GREATER CHALLENGE . . . . . See page 16.

NUCLEAR POWER AND THE ENVIRONMENT . . . . . See page 7.

0280

PRINCIPLES OF THERMAL, FAST AND BREEDER REACTORS (1963). 9 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

This animated film offers an explanation of nuclear fission, the chain reaction, and the control of this reaction in three basic types of reactors. It describes the principles of fast and thermal reactors and introduces the concepts of the moderator and reflector. The breeder principle is described, and plutonium and thorium cycles are indicated. (Use with BASIC PRINCIPLES OF POWER REACTORS, see page 23.)

0372

TOMORROW'S POWER—TODAY (1964). 5½ minutes, color.

Suitable for Understanding Level-2.

Produced for USAEC by Argonne National Laboratory. For sale by NAC.

Briefly explains the principle of atomic power production, states the need for its continued development while showing that it is already in use in many locations across the country. The film explains why the energy of the atom is needed to supplement that of conventional fossil fuels. Animation is used to explain how nuclear fission creates heat and how that heat is converted to electrical power. A comparison is given between the energy released from the uranium atom and coal, gas, and oil. The film concludes with a brief survey of representative atomic power plants in the United States, noting location and kilowatts of electrical power.

PRINCIPLES OF ATOMIC ENERGY

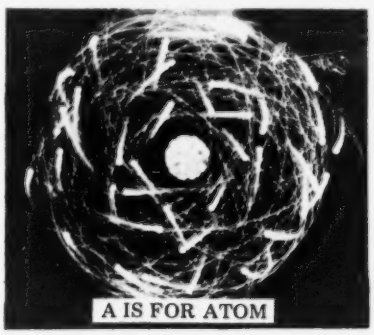
0001

A IS FOR ATOM (1964). 15 minutes, color.

Suitable for Understanding Levels-1 and -2.

Produced by, and for sale by, the General Electric Company. NOT cleared for television.

Begins by describing how the atomic age was born. A nontechnical explanation and illustration of the basic structure of the atom, using an analogy to the solar system, is presented. Fundamental differences of elements in terms of both their atoms and isotopes are discussed and illustrated. The film introduces the concepts of stable and radioactive elements. Also presented are the basic structure and principles of a nuclear reactor. The importance


A IS FOR ATOM

of reactors in the formation of the first man-made elements is described. The film proceeds to explain how a chain reaction is produced and controlled. Concluding the film is a description of the many applications of atomic energy. Atomic energy is depicted as a vast source of power for the present and future. This summary reviews some of the many benefits of atomic radiation in industry, biology, medicine, and agriculture.

0046

ATOMIC PHYSICS (1948). 90 minutes (2 reels), black and white.

Suitable for Understanding Levels-2 and -3.

Produced by J. Arthur Rank Organisation, Ltd. For sale by Universal Education and Visual Arts. NOT cleared for television.

Discusses the history and development of atomic energy, stressing nuclear physics. Dalton's basic atomic theory, Faraday's early experiments in electrolysis, Mendeleev's periodic table, and early concepts and size of atoms and molecules are discussed also. The film demonstrates how cathode rays were investigated and how the electron was discovered; how the nature of positive rays was established; how X rays were found and put to use. The film also presents research tools of nuclear physics, explains work of Joliot-Curie and Chadwick in discovery of neutron, and splitting of lithium atom by Cockcroft and Walton. Einstein tells how their work illustrates his theory of equivalence of mass and energy. One sees and hears such famous scientists as J. J. Thomson, Ernest Rutherford, J. D. Cockcroft and O. R. Frisch. Uranium fission is explained, as well as why it is possible to make an atomic bomb.

BASIC PRINCIPLES OF POWER REACTORS . See page 23.

0096

CONTROLLING ATOMIC ENERGY (1961). 13½ minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by Universal Education and Visual Arts. NOT cleared for television.

A basic teaching film (which uses the conversation of a young student and a scientist who is writing a book about atomic energy) summarizing, briefly, by live action and animation, the following: what is an atom; radioactive atoms; measuring radioactivity; uranium; nuclear fission; the chain reaction; the controlled chain reaction in reactors; how reactors are used for production of electricity for power and propulsion; and the production of radioisotopes for applications in biology, medical diagnosis and therapy, agriculture, industry, and research.

HONORS: 11th CINE Golden Eagle International Award, Washington, D. C.; Blue Ribbon, EFLA, New York City, N. Y.; 10th American Film Festival, New York City, N. Y.; Columbus Film Festival, Ohio; 21st Edinburgh Film Festival, Scotland; Trieste Festival of Science Films, Italy; 3rd International Festival of Experimental & Documentary Films, Cordoba, Spain, 21st International Film Festival, Salerno, Italy; Science, Fact and Fantasy Film Event, Newcastle-Upon-Tyne, United Kingdom; 13th International Festival of Scientific & Educational Films, Padua, Italy; ANZAAS, Australia & New Zealand; 6th International Exhibition of the Scientific Film, Buenos Aires, Argentina.

0180

INTRODUCING ATOMS AND NUCLEAR ENERGY (1963). 11 minutes, black and white or color.

Suitable for Understanding Level-2.

Produced by, and for sale by, Coronet Instructional Films. NOT cleared for television.

Although this teaching film—explaining the general structure of the atom and showing how changes in the nucleus may produce energy used by man—was prepared for intermediate grades and junior high school use, it will also be useful for lay-level adult audiences that wish a basic, concise primer on the subject. The film discusses: the composition of atoms—protons and electrons; how the nucleus releases the energy of the atom

by losing particles (decomposition); nuclear fission, chain reaction and nuclear reactors; nuclear fusion in the sun; and, very briefly, the uses of nuclear energy.

PROPERTIES OF RADIATION . . . . See page 36.

ORDER BY FILM NUMBER AND TITLE

RESEARCH

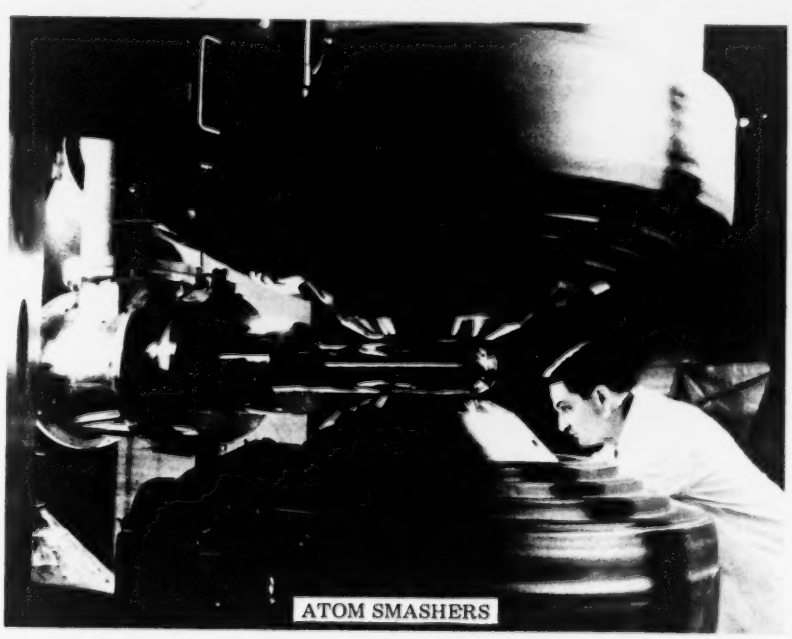
0068

ATOM SMASHERS (Revised 1967). 18 minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Exhibits and Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

An introduction to the principles, purposes and methods of particle accelerators (atom smashers) which are used by physicists to study the nature of sub-atomic particles. The film explains: the electron, proton, the neutron; studies of the sub-atomic particles that make up the nucleus; use of the bubble chamber to photograph the "tracks" of sub-atomic particles. The "projectiles" are particles—electrons and protons. The "powder charge" is electromagnetic attraction and repulsion. The "barrels" are circular or linear vacuum tubes. Views are shown of the two-mile long accelerator at Stanford. Explanation is given of circular accelerators: the cyclotron in which "atomic bullets"—exposed to rapidly alternating electrical forces—travel in ever-widening circles, and other accelerators in which the particles speed around, as on a racetrack, until they almost reach 186,000 miles a second. Views of circular accelerators are shown: the Bevatron, the AGS and the planned 200 Bev.



ATOM SMASHERS

ATOMS IN AGRICULTURE . . . . . See page 1.

0431

EXPLORING THE ATOMIC NUCLEUS (1969). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced and for sale by Coronet Instructional Films. NOT cleared for television.

Describes particles accelerators—the basic tools of high energy physics used to explore the atomic nucleus. The purpose of the film is to show some of the recent discoveries physicists have made concerning nuclear structure, the basic equipment used, and how the resulting data are analyzed. The film shows concepts of atomic structure, how the atomic nucleus is bombarded with other particles, how particle interactions are detected, and the analysis via bubble chamber photographs.

The exploration of the atomic nucleus is one of the frontiers of physics. Using massive particle accelerators, physicists accelerate atomic particles to speeds approaching that of light, and use them to bombard the nuclei of various elements. From the resulting collisions, new particles are created which are directed into detection devices such as scintillation counters, Cherenkov counters, spark chambers and bubble chambers. Analysis of bubble chamber photographs shows how inferences are made regarding the nature of nuclear particle interactions. As scientists study these interactions, and the new particles available for analysis, they modify their ideas as to what the atomic nucleus is like and thus learn more about the basic nature of matter itself.

0161

THE HIGH ENERGY PEOPLE (1963). 5¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Offers a brief description of the problems and tools of high energy physics, illustrated by some of the work being done with Zero Gradient Synchrotron. Scientists and technicians who work with this giant atom smasher describe various phases of their work. Aside from the Synchrotron itself, the Spark Chamber is shown and explained, as are the automatic cameras which photograph the tracks of sub-atomic particles. Examination and analysis of the photographs are also described.

0202

THE MASS OF ATOMS (1966). 47 minutes total (Part I—20 min., Part II—27 min.), black & white.

Suitable for Understanding Levels-2 and -3.

Produced and for sale by Educational Services Inc. for the College Physics Film Program under a grant from the National Science Foundation.

The step-by-step operations in an experiment performed by two Mound Laboratory scientists to determine the masses of a helium atom and a polonium atom. Throughout the film, the various laboratory techniques and precautions necessary for these measurements are shown in detail. In addition, students will learn something of radio-chemical techniques.

In Part I, a sample of radioactive polonium is weighed and sealed in an evacuated quartz tube, and then left to decay. The collection of alpha particles from the decaying polonium provides a sample of helium. In Part II, after a three-week period, the mass of helium sample accumulated is determined, and the rate of decay of the

polonium is measured. From these data the atomic masses of helium and polonium are determined.

0208
METALS FRONTIER (1961). 22 minutes, color.

Suitable for Understanding Level-3.

Produced and for sale by Iowa State University Film Production for the Iowa State Institute of Atomic Research and the Ames Laboratory of the USAEC.

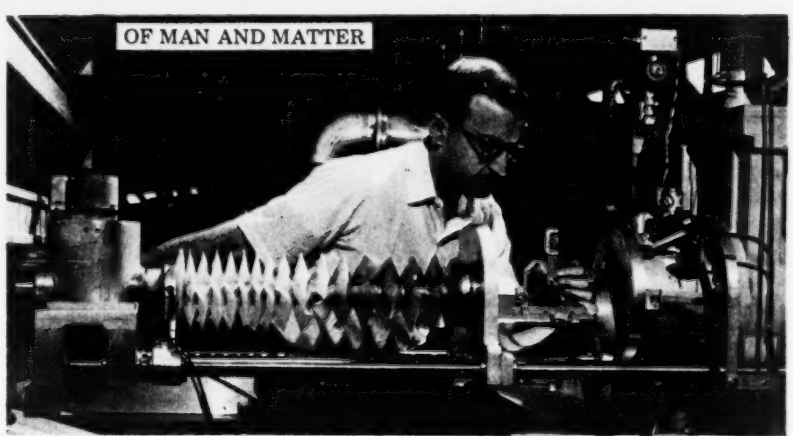
A story of teamwork in research, is designed for an audience with an appreciable degree of scientific sophistication, primarily seniors and graduate students in the physical sciences and engineering. Highlights in the operations of the Ames Laboratory, a major installation of the USAEC, are shown by illustrating the steps in the development of the process for the production of yttrium metal. The film also gives insight into the facilities and the pioneering tradition of Ames Laboratory in the investigation of the rare earths. The film is panoramic in style, showing how basic research, development, and production go along together. The following steps in metal processing are shown: separation of yttrium from rare earths, conversion to fluoride, reduction, and arc melting. Special emphasis is given to purity and to the need for careful analytical control. The film also shows how the graduate student fits into the laboratory's research program.

0238
OF MAN AND MATTER (1963). 29 minutes, color.

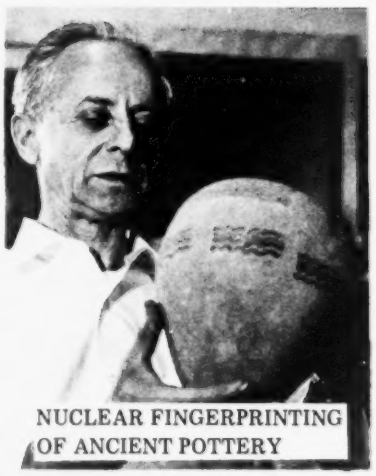
Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Brookhaven Laboratory. For sale by NAC.

Describes the design, development and operation of the alternating gradient synchrotron (AGS) at Brookhaven National Laboratory, shows the various major components of this 33 billion-electron-volt particle accelerator, and explains how the high energy protons produced in the machine are used in physical research. An actual experiment is seen, in which the particle beam is guided into a bubble chamber and the resultant interactions with the target nuclei are photographed. The methods adopted in scanning and analyzing the photographs are also shown. By means of a brief lecture, a Brookhaven physicist explains that such gigantic and complex machines as the AGS are necessary in order to study the fundamental particles and the forces within the atomic nucleus that are the basic components of all existing matter.


OF MAN AND MATTER

ORDER BY FILM NUMBER AND TITLE


NUCLEAR FINGERPRINTING OF ANCIENT POTTERY

0453
NUCLEAR FINGERPRINTING OF ANCIENT POTTERY (1970). 20 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

The nuclear "fingerprint" of an ancient piece of pottery is an extremely precise chemical analysis of the material in that item by nuclear techniques. The fingerprint is obtained by first removing a small sample of the pottery item, then irradiating the sample inside a nuclear reactor. The radioactive isotopes produced emit different amounts and intensities of radiation, which are analyzed by a germanium detector and other electronic equipment. The data are then converted into an extremely precise chemical analysis. Animation is used to explain several techniques, one of which is the operation of germanium detectors, developed extensively at the laboratory, which separate the many complex radiation energies emitted from irradiated pottery. A documentary section of live sound and true action gives the audience insight into how the research is actually conducted. The nuclear technique of pottery identification gives archeologists a means of knowing where pottery came from, which is independent of stylistic criteria and does not depend upon inferences as to where particular styles arose. The film illustrates some actual results from which imported and locally made potteries were distinguished when this could not be done with confidence on stylistic grounds alone. By retaining this data in the computer bank, the beginning of a fingerprint file on ancient pottery is underway.

HONORS: 8th Show of Technical Scientific and Educational Films in Industry, Pardubice, Czechoslovakia; 1970 Industrial Photography Festival, New York City, N. Y.; 1970 Industrial Management Society, Chicago, Illinois; Information Film Producers of America, 1970 National Conference, Los Angeles, California; 1970 Chicago International Film Festival, Illinois; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil; 20th International Festival of Mountains and Exploration Films, Trento, Italy.

0427
PEOPLE AND PARTICLES (1968). 27 minutes, black & white.

Suitable for Understanding Levels-2 and -3.

Produced by Harvard Project Physics. For sale by Holt, Rinehart and Winston, Inc.

Shows the life, thinking and work of a team involved in a research project in a

modern high-energy physics laboratory. You watch experimental physicists, engineers, technicians and graduate students while they prepare for and carry out an experiment using the Cambridge Electron Accelerator (funded by the USAEC) at Harvard University.

The film follows the progress of the team as it sets up and tests one of the basic theories of modern physics—quantum electrodynamics. We watch as wide-gap spark chambers are used for detecting and measuring aspects of electron-positron pairs as they traverse on electromagnetic field.

HONORS: First Colloquium of Research & Educational Cinematography, Brno, Czechoslovakia; 6th International Festival of Science Fiction Films, Trieste, Italy; 5th International Festival of Scientific—Technical Films, Belgrade, Yugoslavia.

ROUNDUP . . . . See page 3.

0406

SOLAR ECLIPSE EXPEDITION 1966 (1967). 32 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the USAEC's Los Alamos Scientific Laboratory. For sale by NAC.

In its constant investigation into the sources and effects of nuclear energy, the USAEC's Los Alamos Scientific Laboratory has turned to sophisticated studies of the sun, the aurora, and the events of near space. One of these investigations was the airborne Solar Eclipse Expedition of 1966. The semi-technical film begins with a brief discussion of solar physics, and uses animation to show what scientists look for when they study the sun's corona during an eclipse. Next it describes the three major experiments designed and built at Los Alamos for the 1966 Solar Eclipse Expedition. Scientists with telescopic, analyzing and photographic equipment travel in NC-135 research jet aircraft to Buenos Aires, Argentina, and then "chase" the moon's shadow over the South Atlantic Ocean during the actual eclipse.

HONORS: Scientific Film Festival, Lyon, France; 12th International Festival of Scientific & Educational Films, Padua, Italy.

0358

SUPERCONDUCTING MAGNETS (1967). 12½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Many important areas of research and development involve the use of large electromagnets. These large magnets require correspondingly large amounts of power and cooling equipment. By constructing these magnets with superconducting cable, it is possible to produce coils which require no power to operate. This film is an introduction to the subject.

Superconductivity was first discovered in 1911 by the Dutch physicist, Kammerlingh Onnes, but commercial materials were not available until 1961. Already several hundred small superconducting magnets are being operated in laboratories throughout the world, and a number of large magnets have been operated successfully. This rapid development has been made possible by ingenious magnet and fabrication techniques. These designs make it possible to produce completely stable magnets of very large size. This film describes the basic design problems and includes pictures of Argonne National Laboratory's 67,000 gauss magnet during fabrication and testing.

HONORS: Gold Transistor Award, 15th International Electronic, Nuclear, Radio, and Motion Picture Congress, Rome, Italy; Chris Statuette, 15th Columbus Film Festival; International Association of Machinists & Aerospace Workers 1969 Conference, San Jose, California; Science Film Theater, American Association for the Advancement of Science, Boston.

0484

A SUPERCONDUCTING MAGNET FOR FUSION RESEARCH (1971). 22 minutes, color.

Produced by the Lawrence Livermore Laboratory for the USAEC. For sale by NAC.

In nuclear research intense magnetic fields are generally agreed to be the most promising means of confining hydrogen plasma to produce controlled fusion energy on earth.

At the Lawrence Livermore Laboratory of the University of California, a 13 ton superconducting magnet has been designed and fabricated for the new Baseball II neutral beam injection experiment. This huge liquid helium-cooled magnet operates at cryogenic temperatures and is capable of containing dense gases whose temperature reaches 300,000,000 degrees centigrade.

This film describes the general concept of the experiment, the winding and installations of the magnet system, and initial testing of the new fusion research facility.

0428

SYNCHROTRON (1968). 14½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Harvard Project Physics. For sale by Holt, Rinehart and Winston Inc.

Discusses the components and operation of the Cambridge Electron Accelerator (CEA), a high energy physics research laboratory funded by the USAEC, operated by MIT and Harvard University.

Dr. William Shurcliff, a physicist and Senior Research Associate at the CEA explains the synchrotron, showing key components by means of a visit to the accelerator, animation and cutaway models. Drawings show the injection of the electrons (bullets), their entrance into the 240-foot-diameter accelerator ring, their acceleration to more than 99 percent the speed of light, and how they are released from the synchrotron to strike the nuclei and particles in the nuclei of atoms, thus permitting physicists to study the interaction between particles and the creation of new sub-atomic particles.

In the large, complex Experimental Hall, we watch scientists and technicians in a variety of experiments to test old and new theories of the basic nature of matter, using bubble chambers, scintillation counters and spark chambers.

ORDER BY FILM NUMBER AND TITLE

0398

THE WORLDS WITHIN (1963). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for USAEC by Stanford University. For sale by NAC.

Describes the design, construction and use of SLAC, the new Stanford Linear Accelerator. A comparison is made of the various methods man uses to "see" particles of smaller and smaller dimension—using the magnifying glass, the microscope, the electron microscope, and the electron linear accelerator. Some historical background is given on the development of the linear accelerator. Scientists and engineers involved in the SLAC project discuss the theory of its operation and some of the problems related to building and operating this huge instrument to explore the structure of the atom and discover new particles. The fabrication of the 2-mile long copper tube, with a bore of only one inch in diameter, through which atomic particles will be fired, is shown and explained in some detail.

PERSIMMON: A Nuclear Physics Experiment . . . . . See page 51.

TRIP STEEL . . . . See page 43.

SAFETY, WASTE DISPOSAL, AND RADIATION

ATOMS IN THE MARKET-PLACE . . . . . See page 10.

ATOMS ON THE MOVE: Transportation of Radioactive Materials . . . . . See page 58.

THE FUEL OF THE FUTURE (1965) . . . . . See page 34.

0154

HANDLE WITH CARE: THE SAFE HANDLING OF RADIOISOTOPES, (1963). 21½ minutes, black and white.

Suitable for Understanding Levels-2 and -3.

Produced for the International Atomic Energy Agency by, and for sale by Sterling Educational Films, Inc. NOT cleared for television.

Covers some of the methods of safe handling of radioisotopes in a laboratory and points out the procedures followed by laboratory personnel to avoid contamination. While the film is instructional, its contents is presented in the form of a story of an unlikely, but possible, contamination incident, as a scientist goes about his work in an apparently methodical and routine manner. As he recalls the happenings of the day, the audience sees in detail all the procedures used in the safe handling of radioisotopes. The mystery of the contamination is solved at the end of the film. The film shows the use of protective clothing, radiation measuring devices such as film badges, dosimeters and counters, the handling of the radioisotopes in an experiment using a fume hood, and clean-up procedures following an experiment.

ORDER BY FILM NUMBER AND TITLE

RADIATION PROTECTION IN NUCLEAR MEDICINE . . . . . See page 46.

0299

RADIATION SAFETY IN NUCLEAR ENERGY EXPLORATIONS (1962). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Communicable Disease Center for the Division of Radiological Health, U. S. Public Health Service, in cooperation with the USAEC. For sale by NAC.

Describes radiation-safety activities of the U. S. Public Health Service (USPHS) Division of Radiological Health in the environmental surveillance of radiation and the protection of public health during certain USAEC nuclear-energy experiments on the peaceful uses of atomic energy [nuclear explosives (Operation PLOWSHARE), aerospace program, and seismic research in the detection of underground nuclear detonations]. A brief review of major accomplishments in medical, industrial power and propulsion, and agricultural research applications of nuclear energy is presented, together with a summary of areas of further experimentation in the peaceful applications of atomic energy. These include experiments in the underground storage and recovery of heat, the economic feasibility of using nuclear explosives for excavation and earth-moving operations, the potential for producing isotopes underground, and the development of a nuclear-powered rocket and ram-jet engine. The USPHS radiological health-safety program provides assurance that the health and safety of the public are protected during the operational phases of these nuclear-energy explorations. It includes the collection and laboratory analyses of air, water, milk, and food samples; ground and aerial monitoring with Geiger counters and continuous recorders; a film-badge program to measure accumulated

gamma exposure, if any; use of fallout trays; liaison with state health agencies; a public information program, a veterinary program and animal studies; epidemiological studies to evaluate the dose-effect relations of radiation; and a medical liaison officer network for consultation with local physicians and medical societies.

RADIOLOGICAL SAFETY
. . . . . See page 37.

R-A-P: RADIOLOGICAL ASSISTANCE PROGRAM—TEAMWORK IN EMERGENCIES . . See page 56.

0458

SAFETY IN SALT: The Transportation, Handling and Disposal of Radioactive Waste (1971). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for USAEC by the Motion Picture Production Division of USAEC's Sandia Laboratories. For sale by NAC.

As the use of nuclear power grows, ways are being found for the safe, permanent storage of the radioactive wastes. Based on thorough geologic studies, the National Academy of Sciences in the mid-1950's proposed salt mines as potential permanent storage sites.

In June 1970, the AEC proposed to establish the first Federal Radioactive Waste Repository in an abandoned salt mine in Lyons, Kansas. This film outlines the research and the rationale to establish such a repository and describes the various transportation systems being considered. A considerable portion of the film was shot during a public hearing in Lyo Kansas, conducted by representatives of the AEC for members of the general public and the news media.

Another part of the film describes tests which are done to determine that the approved packages will withstand severe transportation accidents without release of radioactivity. Other sequences detail transportation systems now in use—safety techniques developed for packaging and shipping radioactive wastes.

HONORS: 1971 International Association of Machinists Conference, Groton, Connecticut.

SAFETY IN THE PLOWSHARE PROGRAM
. . . . . See page 48.

SPACE AND SNAP (SYSTEMS FOR NUCLEAR AUXILIARY POWER)

ORDER BY FILM NUMBER AND TITLE

0429

THE ATOM AND THE MAN ON THE MOON (1969). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the General Electric Co. for USAEC. For sale by NAC.

Describes SNAP-27, its mission and its role in the Apollo program. On an early Apollo flight, astronauts on the moon will install a small scientific laboratory to conduct lunar surface experiments. After they depart for earth, the laboratory—known as ALSEP, Apollo Lunar Surface Packages—will remain, transmitting its research data to receiving stations on earth for several years. ALSEP is powered by electricity from atomic energy—a highly reliable, radioisotope-fueled thermoelectric generator called SNAP-27. The film explains how tiny grains of radioactive plutonium-238 in a sealed fuel capsule generate heat which, in turn, generates electricity directly by means of thermocouples. In simulated action on earth, we see astronauts unloading ALSEP and inserting the nuclear fuel capsule. The film discusses the type of lunar surface information the radioisotope-powered ALSEP will send back to earth, and the temperature stresses and vibration tests to which SNAP-27 has been subjected. Technology developed for SNAP-27 also will be of assistance to the aircraft and other industries.

HONORS: International Association of Machinists & Aerospace Workers 1969 Conference, San Jose, California.

0038

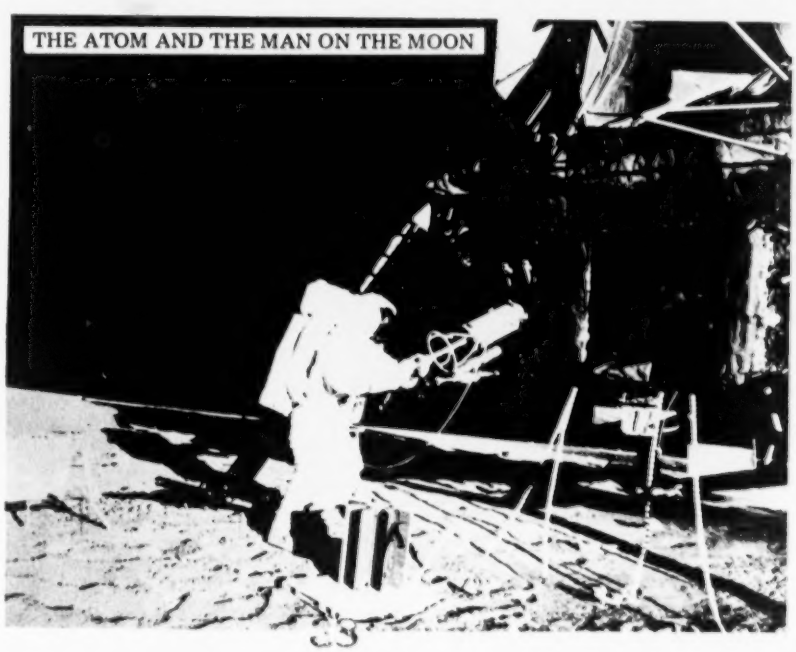
ATOMIC ENERGY FOR SPACE (1966). 17 minutes, color.

Suitable for Understanding Level-2.

Produced and for sale by the Handel Film Corporation. For television clearance, write to Audio-Visual Section, OIS, USAEC, Washington, D. C. 20545.

Nuclear energy for space is being developed through two basic applications: the nuclear rocket for space propulsion, and in isotopic or reactor power plants which can produce the electricity essential for spacecraft operations.

The efficiency of nuclear and chemical rockets is compared, and it is noted that there will be a great reduction in the weight of the nuclear propulsion system as opposed to chemical rockets. The "fission" process—to produce nuclear heat—is explained with animation, as well as



how this heat is used to produce thrust in the versatile nuclear engine.

The film then turns to the SNAP devices—devices that supply electricity for all the various housekeeping and operational sub-systems of spacecraft and satellites (radio, TV, transmitters, computers, etc.). There are two types: isotopic generators (atomic batteries) and the nuclear power reactor. The film shows the first isotopic space generator which went into orbit in a satellite in 1961. Also explained and illustrated is the nuclear reactor for auxiliary power, with scenes of the 1965 launch of the first reactor into orbit. This SNAP-10A reactor produced a half million watt-hours of electricity during operation.

0135

FIRST REACTOR IN SPACE: SNAP-10A (1966). 14½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by Atomics International. For sale by NAC.

Development, launch and results of the world's first nuclear reactor power system to operate in space. The SNAP-10A unit, consisting of a nuclear reactor and power conversion unit, was thrust into a 700 nautical mile, nearly circular orbit in April 1965 from Vandenberg Air Force Base. Following remote start-up, the power plant was operated successfully for 43 days and produced more than 500,000 watt-hours of electricity.

SNAP-10A, a compact reactor, is coupled to a thermoelectric converter-radiator unit which converts heat from fission in the reactor directly into electricity. The heat is transferred to the power conversion unit by a liquid metal coolant, an alloy of sodium and potassium. The SNAP-10A system generates approximately 500 electrical watts.

The motion picture also describes safety of the SNAP reactor during fabrication, testing, transport, installation, launch and use in space, as well as data obtained from the flight. Detailed sequences filmed at Atomics International on fabrication and testing show the simplicity and compactness of the reactor.

0226

NUCLEAR POWER FOR SPACE—SNAP-9A (1963). 12 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Martin Company. For sale by NAC.

After showing the launching of a new satellite, which is being wholly powered by a nuclear generator, animation is used to explain the use of its isotopic generator to create power to run electronic equipment, recording equipment, and transmit data back to earth for analysis. The advantages of nuclear energy are shown over the use of chemical energy and solar energy. The principles of power generation by isotopic decay are explained, showing how thermocouples convert the decaying isotopes' heat directly to electricity. A comparison of the isotopes Plutonium-238 and Curium-242, both used in SNAP isotope power systems, is made. It discusses the design features of the SNAP-9A which are the result of 7 years of research. Safety tests of the isotope capsule, including explosion tests, fire tests, impact tests, and re-entry tests are shown.

ORDER BY FILM NUMBER AND TITLE

0434

NUCLEAR PROPULSION IN SPACE (1968). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Graphic Films for NASA and USAEC. For sale by NAC.

Compares the heavy conventional chemical rockets of today with the nuclear-powered rockets of tomorrow, which have less overall weight. Nuclear rockets, with lightweight, high-velocity exhaust (based on hydrogen) will use propellant twice as efficiently as chemical rockets. Nuclear power will result in a significant increase in the velocity of a given payload in space.

The film explains how a nuclear rocket engine works, covering such points as the fissioning of uranium-235 in the reactor core to produce heat, and the passage of the hydrogen propellant through the engine to produce thrust. Next, the film reviews a typical NERVA reactor experiment in which NRX-A reactor system is operated intermittently for an hour, including 16 minutes at full power. The film ends with a look at how such a rocket may one day be used.

0252

OUR NEAREST STAR (1961). 12 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Nuclear Division of the Martin Company. For sale by NAC.

A SNAP isotopic power system has been placed in orbit aboard the Transit-4A navigational satellite. This simple, powerful device is the first application of nuclear power in space. The system, which powers two of Transit's four navigational radio transmitters, is designed to operate for five years or more. Against a background of the Transit Program, this semitechnical film follows the development and testing of the radioisotope fuel capsule and the thermoelectric generator that make up this SNAP system. The film shows the Thor-Able-Star gantry at Cape Kennedy as the SNAP unit is mounted on Transit, and, when the system is launched, the view is from the blockhouse and the launch pad.

0254

PAX ATOMIS: SNAP-7 TERRESTRIAL ISOTOPIC POWER SYSTEMS (1965). 25 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the Martin Company. For sale by Gerald Productions.

Summarizes the parallel development of a family of fully shielded thermoelectric power converters and chemical processing of the radioisotope Strontium-90 fuel. Laboratory procedures are depicted for thermoelectric couple assembly into a compact operating system capable of converting heat energy into electrical current without the need for moving parts.

Fully shielded Strontium-90 fueled, thermoelectric generators, placed into operational service at remote outposts from north of the Arctic Circle to the South Pole, are now proving the feasibility of reliable, unattended electrical power production from heat generated by decay of radioisotopes.

Installation of the SNAP-7 generator family—to power unattended weather stations in Antarctica and the Gulf of Mexico, navigational aids to shipping in Chesapeake Bay and the Gulf of Mexico, deep sea acoustic research in the Atlantic Ocean—is depicted.

The film concludes with a description of current development work and predictions relating to the next generation of Strontium-90 thermoelectric power supplies for terrestrial uses.

HONORS: Best in Class, Industrial Film Awards Competititon, Industrial Photography Magazine, N. Y.

0271

POWER FOR PROPULSION (1965). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Aerojet-General Corporation. Queries on sale of prints should be directed to Aerojet-General Corporation.

Traces the history of power sources for propulsion from Watt's tea kettle to atomic rocket engines. The major steps are covered: Goddard's 1926 rocket engine, the German V-2's, U. S. Aerobees and Vikings, the Soviet 1957 Sputnik followed by the first astronauts and then reactor power for ships. The importance of Robert Goddard's liquid rocket and Enrico Fermi's atomic pile is stressed, with particular emphasis upon the inevitable fusion of these two great power sources into one massive propulsion system. Animation sequences are used to illustrate principles of rocketry, Newton's Law of Motion and operation of nuclear rocket engines. Actual development of NERVA, Nuclear Engine for Rocket Vehicle Application, is shown, including its first test firing at the AEC-NASA Nuclear Rocket Development Station in Jackass Flats, Nevada. Finally, U. S. developments for deep space pay-load missions to the moon, a fly-by of Mercury, then Venus, Mars and beyond for new insights into the universe.

0346
SNAP-8: SYSTEM FOR NUCLEAR AUXILIARY POWER (1966). 10 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Aerojet-General Corporation. Queries on sale of prints should be directed to Aerojet General Corporation.

Shows the principal components and, in animation, illustrates and explains the operation of the system. Actual fabrication of components and subsystems is also shown, as well as the extensive testing programs currently underway. Thus, SNAP-8 is not a drawing on a drafting table, but a technological reality. Animation sequences are used to depict potential missions of the SNAP-8 system, including power for: TV satellites to broadcast all over the earth, orbiting space stations to support earth observation and space research, maintenance of permanent lunar bases, and manned explorations beyond the moon.

In order to travel in space, man must take his own environment with him. This requires power to supply oxygen, drinking water, air conditioning, lighting and to operate communication systems; in short: power to maintain equipment and sustain life itself. This is possible because nuclear energy provides a source of continuous, uninterrupted power. Space voyagers too, need this same kind of power, and this is where SNAP-8 comes in—using a mercury-vapor turbo-generator system to convert heat from a nuclear reactor into useful electricity.

HONORS: 4th International Festival of Scientific & Technical Films, Brussels, Belgium; 5th International Festival of Science Films, Lyon, France.

0347
SNAPSHOT (1965). 29 minutes, color.

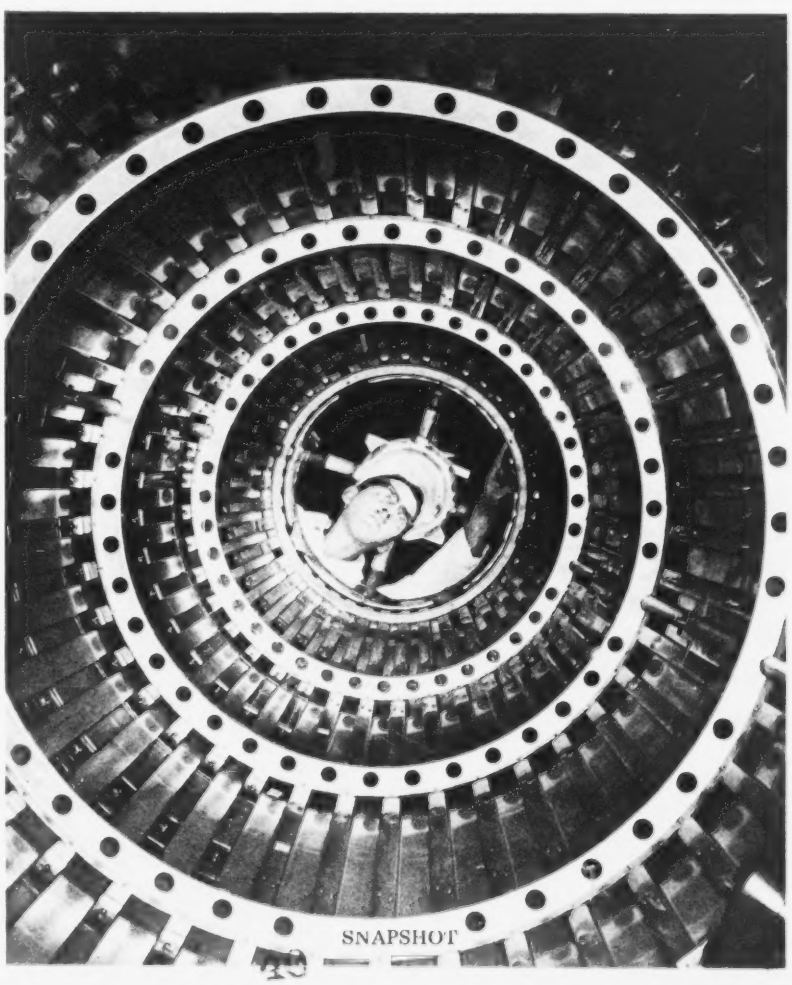
Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by Atomics International. For sale by NAC.

This film describes the flight test in space of the 500-watt (SNAP-10A nuclear space power system. SNAP-10A will be mated to the forward end of an Atlas-Agena booster system and launched from Vandenberg Air Force Base, California. Primary objective of the SNAPSHOT flight, a cooperative effort of the U. S. Atomic Energy Commission and the U. S. Air Force is to obtain technical information and demonstrate the utility of nuclear reactor power systems for application in America's space programs. Orbital startup and operation in space of the reactor and the thermoelectric power converter are explained by animation. Highlighted in this film is the extensive development and testing program which has resulted in the flight-ready SNAP-10A power system. A series of qualification system tests, including a full-scale nuclear system ground test in a simulated space environment, is reviewed and summarized. This series of tests duplicated the environments the flight system will endure through factory assembly, shipping, launch, and orbit operation. The film explains the need for SNAP reactor power systems in current and future space projects.

HONORS: 12th International Nuclear Congress, Rome, Italy; 3rd International Festival of Films on Science Toronto, Canada.

0430
THE WEATHER EYE (1969). 13 minutes, color.



SNAPSHOT

Suitable for Understanding Levels-2 and -3.

Produced by the Office of Information Services, USAEC. For sale by NAC.

The story of the design, development and fabrication of SNAP-19, a small, long-lived, radioisotope-fueled nuclear generator whose mission is to be the auxiliary power supply to produce electrical power aboard a Nimbus weather satellite 600 nautical miles above the earth. As the orbiting Nimbus monitors changing weather patterns in the atmosphere, SNAP-19 supplements the work of solar cells in powering the data-gathering instruments and transmitters that supply information continuously to meteorologists on earth. Nimbus 1 and 2 weather satellites used only solar cells. Now, SNAP-19, which can operate continuously in sunlight or darkness, gives NASA and USAEC the opportunity to study onboard nuclear energy as an electrical power source for instrumentation. The film describes the design, testing and fabrication of the generators, in which the heat from the radioisotope plutonium-238 is converted directly to electrical power by means of thermocouples. To assure SNAP-19's safety and integrity, vibration and acceleration tests are conducted. Seals and materials are tested under many conditions, including the simulated cold and vacuum of space—not only for the important weather satellite mission, but also to gather data for the day when power from radioisotopes will help men explore distant worlds.

HONORS: 70th International Convention in Electronics Engineering, New York City, N. Y.

ORDER BY FILM NUMBER AND TITLE

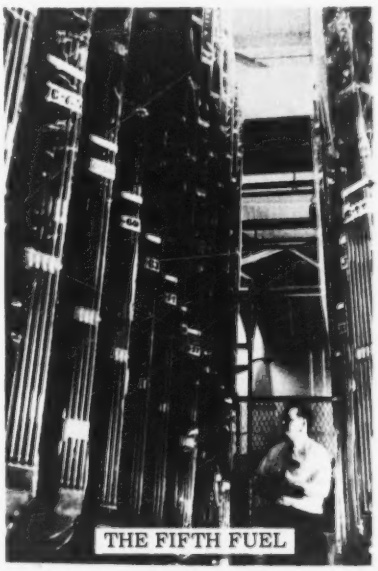
URANIUM PROSPECTING, MINING, AND PRODUCTION

0409

THE FIFTH FUEL (1967). 22 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Oak Ridge Operations for the USAEC. For sale by NAC.



THE FIFTH FUEL

A fifth fuel—uranium—has become a useful source of energy: taking its place alongside of wood, coal, natural gas and oil, to provide power for our civilization and growth. This film explains the steps involved in preparing enriched uranium (U-235)—from the mining operation, through the exacting chemical and metallurgical processes (as exemplified by the work at USAEC's Feed Materials Production Center at Fernald, Ohio, performed to obtain a pure material), to the extrusion of precisely structured fuel elements at Ashtabula, Ohio. The film explains how such fuel cores are used to transmute Uranium-238 into plutonium at production reactor sites. Safety features throughout the various processes are emphasized. The gaseous diffusion process is touched on briefly.

HONORS: 1970 International Festival of Scientific Films, University of Brussels, Belgium.

0147

GASEOUS DIFFUSION (1958). 3 minutes, black and white.

Suitable for Understanding Levels-2 and -3.

Produced by USAF Audio Visual Center. For sale by NAC.

This nontechnical animation-film illustrates the gaseous diffusion principle and method for separating Uranium-235 from Uranium-238, as accomplished at U. S. Atomic Energy Commission gaseous diffusion plants at Portsmouth, Ohio; Oak Ridge, Tennessee; and Paducah, Kentucky.

0256

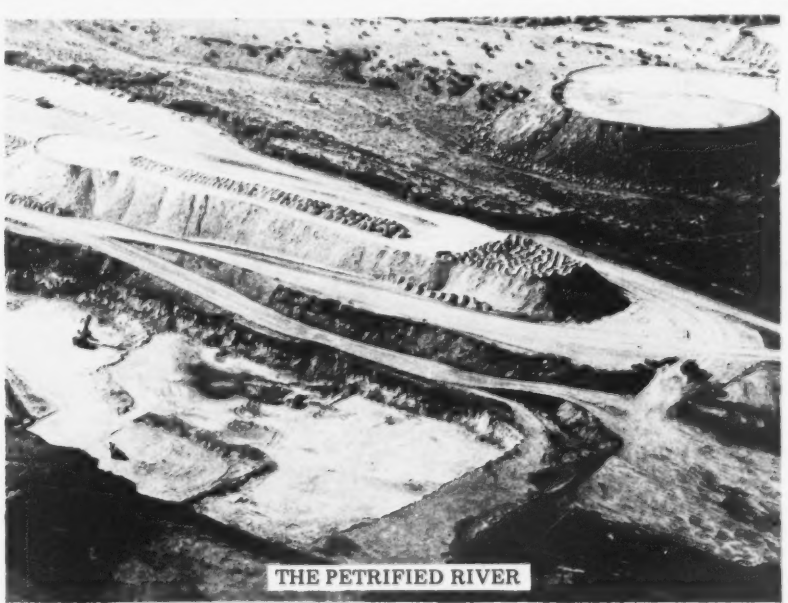
THE PETRIFIED RIVER (1956). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Union Carbide Corporation and the U. S. Bureau of Mines under the technical direction of USAEC.

Describes how uranium was deposited during prehistoric, geologic ages; shows early prospecting on the Colorado Plateau; mining and milling of uranium ores; and the use of the atom's energy for power and to produce radioisotopes for medical diagnosis and therapy, agriculture, industry and research.

ORDER BY FILM NUMBER AND TITLE



THE PETRIFIED RIVER

CHALLENGE SERIES

CHALLENGE Series. Each film 29 minutes, black and white.

Suitable for Understanding Levels-2 and -3.

The series provides an in-depth description of basic research in the nuclear sciences at the USAEC Argonne National Laboratory. The films visit various facilities in presenting explanations, demonstrations, and discussions of nuclear-science principles, research tools and methods, and the projects to which they apply. Leading scientists provide narration. Produced by Ross-McElroy Productions for the National Educational Television and Radio Center, under a grant from USAEC's Argonne National Laboratory. The films are for sale by NET Film Service.

0182
INVISIBLE BULLETS (1962).

Introduces the series and establishes the basic knowledge about radiation necessary for an understanding of the other films in the series. The meaning of radiation, its natural sources, the various forms it takes, and how it is used in research are explained. The difference between alpha and beta particles and between gamma rays and X-rays is described.

0011
THE ALCHEMISTS'S DREAM (1965).

Transmutation of metals, the dream of the alchemists in the Middle Ages, is shown and explained in its nuclear science context by members of the Argonne Chemistry Division. A minute quantity of berkelium is produced by bombarding curium with deuterons from a cyclotron. The berkelium is separated and purified behind the thick walls of a newly constructed hot laboratory for research with man-made elements.

0019
THE ART OF SEPARATION (1962).

Deals with the separation of chemical compounds into basic substances in the purest form possible by the process known as chromatography and with the importance of that process in chemistry work. Using radiation, the chemist is able to work with much greater speed and ease in the field of chromatography. The basic principles and various methods of modern chromatography are explained and demonstrated. Actual separation of a chemical compound is shown.

0040
ATOMIC FURNACES (1962).

The operation, principles, and scientific applications of nuclear reactors, used as research tools in various projects, are briefly described. Types of research that reactors and associated equipment make possible are shown at length. The Gamma Ray Spectrometer, the Neutron Chopper, and a new reactor designed specifically for high- and low-radiation experiments in biology are also described.

0081
A BREEDER IN THE DESERT (1965).

Argonne's Experimental Breeder Reactor II at the National Reactor Testing Station in Idaho is shown in detail, and many of the features and operating characteristics of a large-scale fast breeder reactor are described. The EBR-II Fuel Cycle Facility, first nuclear fuel reprocessing plant completely integrated with a reactor, is shown in operation.

0084
BUILDING BLOCKS OF LIFE (1962).

Unique fragments of molecules caused by radiation in living systems, which are known as free radicals, either kill or seriously damage living cells. The how and why of both the particles and the damage they cause is the topic of this film.

0089
A CHEMICAL SOMERSAULT (1965).

A commonly accepted scientific maxim, that the inert gases will not form chemical compounds, is shown to be false in this film depicting some of the research of the Argonne fluorine chemistry group. The making of xenon-fluorine compounds is illustrated with laboratory equipment. Research into structures of molecules of these compounds is shown and explained.

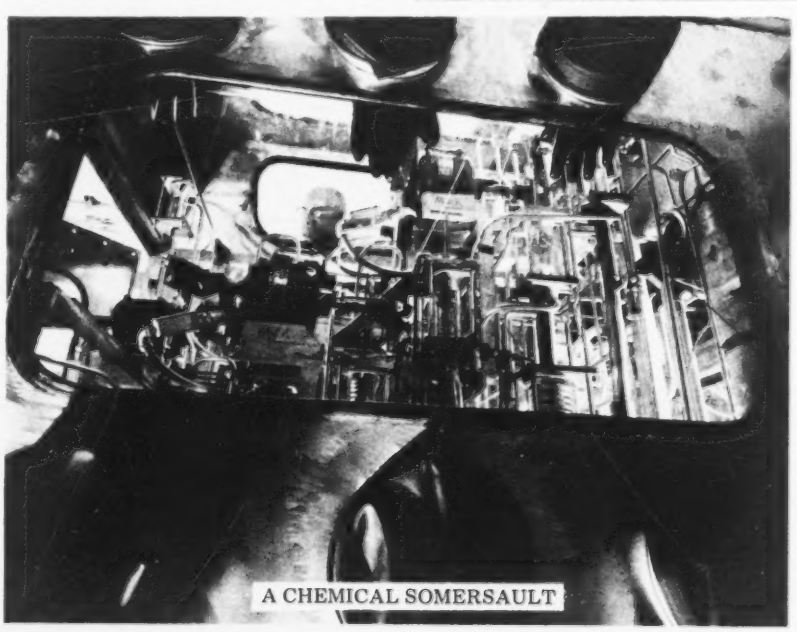
0105
DOWN ON THE FARM (1965).

Algae are grown in heavy water in a unique "farm" at Argonne to obtain organic compounds in which the atoms of ordinary hydrogen are replaced by atoms of deuterium. Scientists show how these deuterated compounds are employed in studies of photosynthesis and other metabolic processes. The presence of deuterium in place of ordinary hydrogen is shown to have a slowing-down effect on many life processes.

0137
FOUNDATIONS FOR THE FUTURE (1962).

Problems that are still to be solved by nuclear scientists are discussed in this film. Areas of particular interest to the scientist in his work now and in the future are identified as being the

ORDER BY FILM NUMBER AND TITLE



A CHEMICAL SOMERSAULT

effects of radiation, the peaceful uses of radiation, and the dangers of radiation.

0141
THE FUEL OF THE FUTURE (1965).

Special precautions and techniques employed in working with plutonium are shown in a unique engineering laboratory, the Argonne Fuel Fabrication Facility, where work is performed within sealed glove boxes under an inert atmosphere. The manufacture of experimental reactor fuel pins containing plutonium is illustrated step-by-step.

0155
HARNESSING THE RAINBOW (1965).

Uses of spectroscopy in a nuclear laboratory are illustrated with instruments ranging in complexity from a simple prism to one of the world's largest and most complex light spectrographs. Argonne scientists describe the identification of line spectra as a means of studying atomic structure.

0172
THE IMMUNE RESPONSE (1962).

Is concerned with the mechanism by which the body builds antibodies against disease and other foreign substances and with the effects of radiation on this immunizing response. In a demonstration the experimental procedures of the irradiation of rabbits with X-rays is shown and conclusions are discussed.

ORDER BY FILM NUMBER AND TITLE

0192
THE LIVING SOLID (1962).

Shows that bone is not a fairly stable substance but is active, living matter, constantly remodeling and reforming itself. The importance of bone to the entire body as a supplier of calcium is emphasized, and the systems by which this calcium gets from bone to blood and vice versa are illustrated. Effects of radiation are illustrated in photographs of bone cross-sections.

0197
MACHINES THAT THINK (1965).

Research at Argonne into the future scientific uses of electronic computers is shown in this presentation which stresses nonnumerical manipulations of symbols. Computers are taught to make qualitative judgments, to interpret the significance of patterns such as spark chamber photographs, and to control laboratory experimental apparatus.

0210
MICROSCOPE FOR THE UNKNOWN (1965).

The Zero Gradient Proton Synchrotron at Argonne National Laboratory is the scene of this presentation depicting types of experimental apparatus used in high energy physics research. Principles of "track detectors" such as the bubble chamber and the spark chamber are described, and the interpretation of track photographs is explained. A large spark chamber facility for detecting neutrinos and the 30-inch MURA bubble chamber are illustrated in detail.

0292
RADIATION AND THE POPULATION (1962).

Because genetic damage is one of the most serious effects of radiation, the U. S. Atomic Energy Commission genetics program is designed to learn how radiation damages cells and what the long term effects of such damage might be. The film explains how radiation causes mutations and how these mutations are passed on to succeeding generations. Mutation research is illustrated with results of experimentation on generations of mice and includes discussion of work with fruit flies and induced mutations. Fallout and its implications are also discussed.

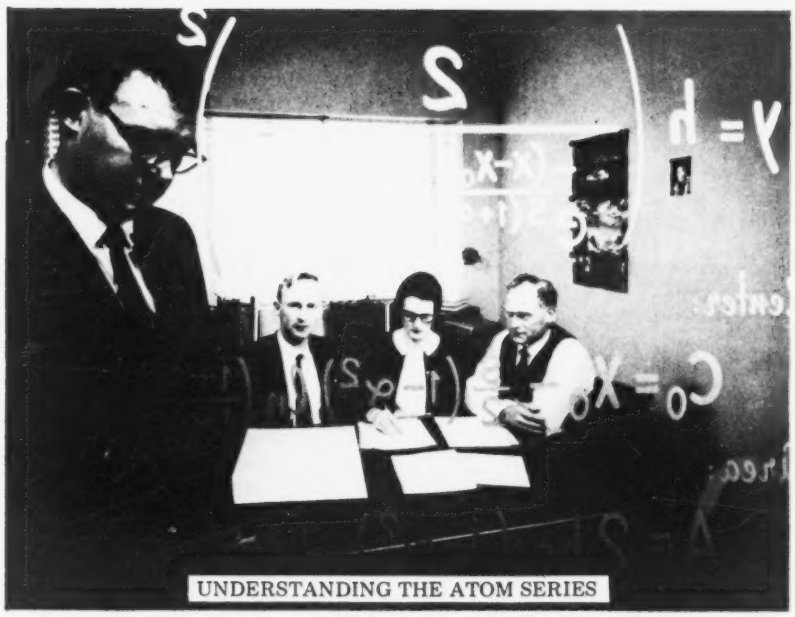
0336
SEARCHING FOR THE ULTIMATE (1962).

Atomic structure, one of the most basic forms of nuclear research, permits the scientist to discover the nature of the universe through the use of atom smashers or particle accelerators. The machines produce intense beams of radiation which enable study of the structure of the atom, the nucleus, and the basic components of the nucleus. This film explains how accelerators operate and shows one of the world's largest particle accelerators being constructed. Sub-nuclear particles and the concept of matter and anti-matter are also explained.

0366
TESTING FOR TOMORROW (1965).

Aspects of nondestructive testing as employed in a nuclear laboratory, are depicted. Among the techniques,

MICROSCOPE FOR THE UNKNOWN



many of them newly developed, are neutron radiography, eddy current testing, ultrasonic detection of voids, and ultrasonic television scanning.

0370
TIME—THE SUREST POISON (1962).

Explores the natural process of aging and the methods used in its study. Aging might be considered one of the deleterious side effects of radiation since radiation injury resembles natural aging in so many ways. Results of study of the aging process involving the use of radiation are presented. The conduct of research on animals using low-level gamma irradiation is illustrated.

0374
TRACING AIRBORNE RADIOACTIVITY (1962).

The principle of air being able to cleanse itself of poisonous substances, including those which are radioactive, is covered in this film. Atmospheric fallout and methods now being used to determine and study such fallout are examined. Fallout studies are discussed which relate man and his environment.

0375
TRACING LIVING CELLS (1962).

Radioactivity is often mankind's servant. In recent years, the use of radioactive isotopes in the study of cell division and in medical therapy has helped man overcome disease. This film demonstrates some of the many helpful and healthful uses of atomic energy, including use of radioactive tracers in blood and cancer research.

0396
WORKING WITH RADIATION (1962).

When properly handled in the laboratory, radioactive materials constitute little danger. This film shows precautions used in working with radiation as well as research effort being made to gain more knowledge about handling radiation. "Hot caves" (radiation chambers) using remote-control mechanical manipulators, caves using electronic type manipulators, and giant caves using heavy-duty manipulators illustrate the safety methods mentioned. Methods used to dispose of radioactive waste materials are also shown.

UNDERSTANDING THE ATOM SERIES

This series of lecture films, designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, is presented by Dr. Ralph T. Overman, former Chairman, USAEC's Oak Ridge Institute of Nuclear Studies. Produced by the Educational Broadcasting Corporation, the films are for sale by NAC.

Suitable for Understanding Levels-2 and -3.

0013
ALPHA, BETA, AND GAMMA (1962). 44 minutes.

Gives some insight into the origin and nature of alpha, beta, and gamma radiation. After a short discussion of the methods of describing atoms and the introduction of the energy-level concept, the lecturer introduces the potential-energy well model of the nucleus. This, together with the barrier model, is used as the frame of reference for a variety of other nuclear concepts. The energetics in alpha emission and the Gamow tunneling effect are used to describe alpha-ray emission and the energy levels in the nucleus. The lecturer discusses neutron absorption leading to the formation of nuclei having neutron–proton ratios differing from stable or naturally occurring nuclei. The transformation of excess neutrons into negative beta radiation and the return to stability are considered in some detail.

ORDER BY FILM NUMBER AND TITLE

0059
THE ATOM IN PHYSICAL SCIENCE (1964). 26 minutes.

This is a lecture by Dr. Glenn T. Seaborg, discoverer of plutonium, who outlines briefly the types of experiments which were used in the production of transuranium elements. These have been discovered using exceedingly ingenious approaches involving quite complex electronics and highly refined chemical techniques.

The film discusses applications to other chemical problems such as the mechanism of photosynthesis and the use of special techniques such as isotope dilution analysis. Of considerable interest also is the description of Carbon-14 dating.

The lecturer closes with a strong statement regarding the need for scientists and the importance of good scientific training in schools.

0227
NUCLEAR REACTIONS (1963). 29½ minutes.

This segment of the series continues the discussion of the film "Alpha, Beta, and Gamma," and involves some of the basic concepts of nuclear reactions. Neutron capture processes are described with the gamma emission and particle ejection reactions being studied. Nuclear fission is also discussed. As an example of the calculations involved in nuclear reactions, the film describes the activation of a gold

sample in a nuclear reactor. Emphasis is placed on the minute quantities which can be detected with the subsequent applications to the technique of activation analysis. It is shown that hundredths of a part per billion of certain materials can be detected by nuclear techniques.

0288
PROPERTIES OF RADIATION (1962). 30 minutes.

Discusses the general problems of radiation decay, such as the laws of radioactive decay, including the concept of half life. Statistical considerations are introduced, and the basic notion of the standard deviation in counts expected in various experiments is described. The energy spectrum from alpha and beta emitters is considered, and the use of absorption curves to study the energy distribution of beta radiation is introduced. The density thickness expressed in milligrams per square centimeter is introduced as a useful term.

0291
RADIATION AND MATTER (1962). 44 minutes.

The film, which considers the interaction of radiation with matter, develops the various processes by which alpha, beta, and gamma radiation give up energy to their surroundings. The similarities and differences of alpha and beta particles are considered, with emphasis on the methods by which ionization occurs. It is pointed out that, since the interaction of radiations in the absorption process takes place essentially only with orbital electrons on the atoms, the density of electrons in matter is the determining factor. The relation between energy of a particle and the number of ion pairs formed is also explained. The lecturer follows with a discussion of gamma, or electromagnetic radiation, which is described as a nonionizing event in terms of the initial interaction between photons and atoms. Four possibilities of gamma-ray absorption (excitation, photoelectric effect, Compton effect, and pair production) are discussed. The viewer, however, is alerted to the fact that there is only a certain probability that one particular process may take place rather than another, depending upon the energy of the gamma ray. This probability, expressed as absorption coefficient, is then related to each of the four absorption processes.

0293
RADIATION DETECTION BY IONIZATION (1962). 30 minutes.

The basic principles of ionization detectors are described, particularly in relation to the pulse height as a function of voltage curves. Brief descriptions of ionization chambers, proportional counters, and Geiger counters are included, and examples of instruments operating in these regions are shown. Special consideration is given to Geiger counters, including the mechanism of gas quenching and the determination of a counting-rate plateau. The resolving time of a counter is discussed, as well as various components of a practical instrument, including amplifiers and scalers.

0294
RADIATION DETECTION BY SCINTILLATION (1962). 30 minutes.

A short review of gamma interac tions with matter is shown, with particular reference to useful scintillation crystals. The scintillation process is described, and the efficiency of the conversion of gamma radiation to visible light in the scintillator is discussed. Solid and liquid scintillators are shown along with special detection devices using this principle. A description of the operation of a photomultiplier tube is given, and the concept of pulse height is developed. The principle of operation of a pulse-height analyzer is shown, and the spectrum obtained with such an instrument is shown and discussed. Brief mention is made of solid-state radiation detectors.

0301
RADIOISOTOPE APPLICATIONS IN INDUSTRY (1964). 26½ minutes.

Discusses some of the practical, simple, and easily understood methods of putting radioisotopes to work in industry. The program features Dr. Paul C. Aebersold, former Director, Division of Isotope Development, USAEC. Using actual radioisotope sources, Dr. Aebersold gives various demonstrations of the degree of their penetrating radiations, the extent to which several types of materials can reduce them and the sensitive methods of detecting them. He explains how the principles involved in the demonstrations are applied to practical uses in industry. Narrating the film, he tells of the actual use of radioisotope gauges in tire plants and steel mills, of radioisotope tracers used in the petroleum and chemical industries, of radioisotope density gauges used in food plants and of other uses of radioisotopes in industry which improve the efficiency of production and the quality of the product.

0302
RADIOISOTOPE APPLICATIONS IN MEDICINE (1964). 26 minutes.

Traces the development of the use of radioisotopes and radiation in the field of medicine from the early work by Hevesy to the present. The program is presented by Dr. John Cooper of Northwestern University, whose discussion includes the area of medical research, diagnosis and therapy. The source of cholesterol in the human body and the applications of this basic information to clinical studies of atherosclerosis is described. Similarly, studies with cobalt-labeled vitamin B-12, used to study pernicious anemia, are also discussed. Most of the information now known about thyroid physiology and pathology has been determined with the aid of various iodine radioisotopes, and standard diagnostic measurements and scanning are described in the film. Brain tumor localization is also covered. A very important area of radioisotope use is the determination of a variety of body fluid volumes such as blood and plasma. Red cell volume and lifetime can also be measured using labeled cells. The film explains how radioisotopes are used for the treatment of various diseases, including hyperthyroidism and cancer.

ORDER BY FILM NUMBER AND TITLE

0306
RADIOISOTOPES IN BIOLOGY AND AGRICULTURE (1964). 26 minutes.

This film is a lecture by Dr. Howard Curtis of Brookhaven National Laboratory who touches on some of the up-to-date applications of atomic energy to biology and agriculture. Reference is made to the importance of radioisotopic tracers in the determination of the structure and role of nucleic acids and other cellular components. This work is done either with various types of counters or autoradiography. For example, the position of DNA in the cell has been determined quite specifically. This information has been exceedingly important in the breaking of the genetic code by determining the area of the sub units on the backbone of the genetically important molecules. Similarly, the structure of proteins has been determined using radioactive tracers. In addition to tracer applications, a great deal of information has been gained by studying radiation effects. This has been important both from the standpoint of fundamental knowledge about growth and also the practical applications of economically important mutations. Interesting examples of plant breeding projects are shown. In the animal sciences, important information on the study of aging has

come out of the use of radiation as a stress. Various theories of aging have been tested, and it appears that aging is primarily associated with the damage to chromosomes. If the DNA is damaged, animals grow older because of basic instability of DNA. Other examples of the importance of radiation to molecular biology are shown.

ORDER BY FILM NUMBER AND TITLE

0310

RADIOLOGICAL SAFETY (1963). 30 minutes.

Examines the field of radiological safety or health physics, and tries to give a basis for a perspective on potential biological radiation damage. It first considers background radiation and the nature of the difference in this radiation. Larger doses of radiation can be a potential cause of both somatic (direct bodily) damage and genetic (hereditary) damage, and consideration is given to the maximum permissible limits or radiation guide levels which have been established by various radiological protection committees and the Federal Radiation Council. Various units are described, with these including the roentgen, the rad, and the rem. The latter unit is a measure of the biological dose equivalent and considers the relative biological effectiveness (RBE) of the radiation. Consideration is aso given to the maximum permissible concentration of radioisotopes in water or air, and the problems involved in the localization of radioactive materials in the body. Various factors that must be controlled in reducing the radiation hazard include the quantity of radioactive material, the distance, the time of exposure, and shielding. Internal exposure must be minimized by the use of special laboratory facilities and techniques which are required to minimize the admission of radioactive isotopes into the body. The importance of having calibrated instruments available is stressed in any program involving the use of radiation sources.

NUCLEAR POWER IN THE UNITED STATES Page 53

Part Two
TECHNICAL-PROFESSIONAL

(For Colleges and Universities; Industry; Researchers, Scientists; Engineers and Technologists)

ANTHROPOLOGY

0455
THE FEAST (1970). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

Approval for television use must be obtained from the Audio-Visual Section, Office of Information Services, U. S. Atomic Energy Commission, Washington, D. C. 20545.

Produced by the Center for Documentary Anthropology of Brandeis University and the Department of Human Genetics of the University of Michigan, with USAEC support. For sale by NAC.

This anthropological film, made by enthnographic film-maker Timothy Asch of Brandeis University and anthropologist Napoleon Chagnon of the University of Michigan, shows the first stages of alliance formation between two of many mutually hostile Yanomamo Indian villages in Southern Venezuela and Northern Brazil. Through feasting, trading, dancing and chanting, the hosts and their guests, wearing only decorative paint and feathers, hope to renew an old alliance, but both--though surrounded by hostile enemies and desperately needing allies-- are fearful because such a feast can end in violence through treachery or flaring of tempers. The story of this impressive documentary is told in a unique fashion: first a brief summary of the events with explanatory narration and still pictures; then a motion picture without narration, recounting in detail the preparation for and holding of the feast, using only the sights and sounds of the event and occasional superimposed translations of the authentic recorded dialogue. This film is one aspect of comprehensive studies of the population genetics of primitive peoples under the overall direction of Prof. James V. Neel, Chairman of the Department of Human Genetics of the University of Michigan, and under the financial sponsorship of the U. S. Atomic Energy Commission.

THE FEAST also YANOMAMA

HONORS: 1970 Golden Eagle, CINE (Council on Nontheatrical Events), Washington, D. C.; 8th New York Film Festival, New York; 19th International Festival of Scientific and Educational Films, Padua, Italy; Grand Prize Trophy, 20th International Tourist and Folklore Film Week, Brussels, Belgium.

ORDER BY FILM NUMBER AND TITLE

0460
YANOMAMA: A MULTIDISCIPLINARY STUDY (1971). 43 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the Center for Documentary Anthropology of Brandeis University and the Department of Human Genetics of the University of Michigan. For sale by NAC. Approval for television use must be obtained from the Audio-Visual Section, Office of Information Services, U. S. Atomic Energy Commission, Washington, D. C. 20545.

Although this unusual film was produced primarily for college and university classes in anthropology and genetics, it will be of interest to all educational levels and general public audiences. Produced by ethnographic film-maker Timothy Asch of Brandeis University, anthropologist Napoleon

Chagnon and geneticist James V. Neel of the University of Michigan, the film illustrates the field techniques used by a team of specialists—from such disciplines as human genetics, anthropology, epidemiology, dentistry, linguistics and medicine—in one of a series of biological-anthropological studies of the Yanomama Indians in the dense jungles of Venezuela and Brazil sponsored by the U. S. Atomic Energy Commission, the National Science Foundation and the National Institute of Mental Health. One of the aims of the project was to discover how physical and cultural factors influence a primitive and isolated population's genetic and demographic characteristics—data basic to understanding man's genetic legacy.

The film describes the scientific objectives, the nature of the problems the team was attempting to study, the kind of data required to discuss these problems, and the significance of tribal populations in the studies of human biology. A thumbnail sketch of the Yanomama culture follows, touching on economy, ritual, daily activities, manufactures, fighting and other selected features of the society. The main body of the film deals with a closer view of each investigator's role in the study and how he goes about collecting data—such as dental casts, blood samples, saliva specimens, language materials, genealogies—and the often warm interpersonal relationships between the researchers and the Yanomama.

HONORS: 4th International Congress of Human Genetics, Paris, France; 1971 Golden Eagle, CINE (Council for Nontheatrical Events), Washington, D. C.

ORDER BY FILM NUMBER AND TITLE

BIOLOGY AND AGRICULTURE

0433
COMBUSTION TECHNIQUES IN LIQUID SCINTILLATION COUNTING (1969). 25 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For Sale by NAC.

The scientific discipline of molecular biology has emerged to dominate the life sciences and open up the new frontiers of biophysics and biochemical research at the molecular and submolecular levels.

The belief that structure and function of the cell can be integrated had led technology to the development of more sophisticated research tools such as electron microscopy, autoradiography, ultra-centrifugation, chromatographic methods, and liquid scintillation counting.

A new refined combustion technique in liquid scintillation counting has been developed at USAEC's Argonne National Laboratory, which combines the simplicity of dry catalytic combustion with the increased efficiency of standard vacuum line techniques. The new technique enables the biologist to prepare and measure very low beta energies in large numbers of biological samples.

HONORS: 1969 CINE Golden Eagle International Award, Washington, D. C.; Lyon Scientific Film Festival, France; Trieste Science Fiction Film Festival, Italy; 14th International Exhibition of Scientific and Educational Films, Padua, Italy; Gold Camera Winner, 1970 Industrial Film Festival, Chicago, Illinois.

THE FEAST
. . . . . See page 39.

0260
PLANT GROWTH IN COMPENSATED FIELDS (1967). 7 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Plant growth is controlled by an extremely sensitive mechanism. Even a brief and minute stimulation by gravity, water, etc., will cause the growing portions of the plant to turn toward or away from the stimulus. Since the gravitational force must operate for a "minimum presentation time," it is possible to neutralize the gravitational field. A mechanical servo-system has been developed by Argonne National Laboratory to neutralize effectively the gravitational effects in all directions. The servo-motors are controlled by a computer program which provides uniform angular distribution, velocity and acceleration.

HONORS: Scientific Film Festival, Lyon, France.

RADIOISOTOPES IN BIOLOGY AND AGRICULTURE
. . . . . See page 36.

RETURN TO BIKINI
. . . . . See page 2.

YANOMAMA: A MULTIDISCIPLINARY STUDY
. . . . . See page 39.

DATA PROCESSING

0422
ACCEL REVISITED: Automated Circuit Card Etching Layout (Revised 1968). 20 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC By Sandia Corporation. For sale by NAC.

ACCEL is a computer program which designs printed circuit boards and produces the drawings for their construction with the input encoded from an engineer's schematic diagram by a clerk without knowledge of electronics. The outputs of the program are a schematic, parts list, printed circuit negative, assembly drawing, and a hole drilling list. ACCEL is written in Fortran II for the IBM 7090 computer and the drawings are produced on the Stromberg Carlson 4020 cathode ray tube plotter. The film describes the operational aspects of the system, as well as the unusual algorithms used to accomplish the design feat. Two items of major significance are (1) the "force placement" algorithm for determining component location; and (2) a routing method utilizing Lee's algorithm and a new technique called topographic simulation.

HONORS: British Computer Society's 1969 Data Fair; 1971 Spring Joint Computer Conference, Atlantic City, New Jersey; Placque, International Federation of Information Processing Congress 1971, Ljubljana, Yugoslovia.

0436
COMPUTER FLUID DYNAMICS (1969). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Los Alamos Scientific Laboratory. For sale by NAC.

Demonstrates the power of today's giant electronic computers for solving problems that previously were impractical to undertake. The examples cover a wide range of fluid flow problems; for example, the water wave produced when a sluice gate is opened. First, it presents the actual laboratory experiment in slow motion; then, for comparison, it shows the unretouched output of an electronic computer study of the same process, so that the viewer can see for himself how accurately the motion has been calculated.

HONORS: Science Film Theater, American Association for the Advancement of Science, Boston.

0416
FIRE LOSS MANAGEMENT, PART II: COMPUTER INSTALLATIONS (1968). 20 minutes, black and white.
Suitable for Understanding Level-3.
Produced by USAEC. For sale by NAC.
Donald J. Keigher and Francis L. Brannigan, USAEC Fire Protection Engineers, discuss the problems of fire protection of automatic data processing installations. Computers represent extraordinarily high values in relatively small spaces. In addition, the information contained on tapes and discs may be literally priceless. Specific fire protection measures and management control of the fire-loss problem are discussed, in turn, for the building in which the computer is housed, the computer room, the computer itself. The effects of actual fires in computer installations are shown, and attention is drawn to the appropriate recognized codes and standards.

0481
INTRODUCTION TO ANALOG COMPUTERS (1963). 2 hours, color.
Suitable for Understanding Level-3.
Produced by USAEC's Argonne National Laboratory. For sale by NAC.
This three-part technical lecture-film (approximately 40 minutes per part) by Dr. L. C. Just of Argonne's Applied Mathematics Division includes: (1) components of electronic analog computers, (2) familiarization with a typical analog computer, (3) programming for analog computers, and (4) solution of typical problems.

0482
LINK (1967). 8 minutes, color.
Suitable for Understanding Level-3.
Produced by USAEC's Argonne National Laboratory. For sale by NAC.
Explains that current experiments in high energy physics involve the analysis of immense quantities of data. A typical experiment using a spark chamber can require the examination of a half million photographs. For analysis each track must be reconstructed from the photographs and located in space so that the particles can be identified and their moments calculated. An experimental computer approach at Argonne National Laboratory centers about a series of programs which match points in the photographs and draw a curve bit by bit. LINK, the program which draws the curve, utilizes an unusual trial-and-error approach which is illustrated by the photographs of an oscilloscope readout as curves are developed.

A particularly interesting facet of the LINK film is its computer-generated avant-garde music. Dr. Arthur Roberts, high-energy physicist at Argonne, combines his talent as a composer with a CDC-3600 computer to generate a number of intriguing sounds which simulate the instruments in an orchestra. The result is an interesting study in computer-performed music which accurately matches the mood of the computer-high energy physics work pictured.

HONORS: 15th Columbus Film Festival, Ohio; Scientific Film Festival, Lyon, France.

MACHINES THAT THINK . . . . . See page 34.

SANDIA SPINOFF . . . . . See page 12.

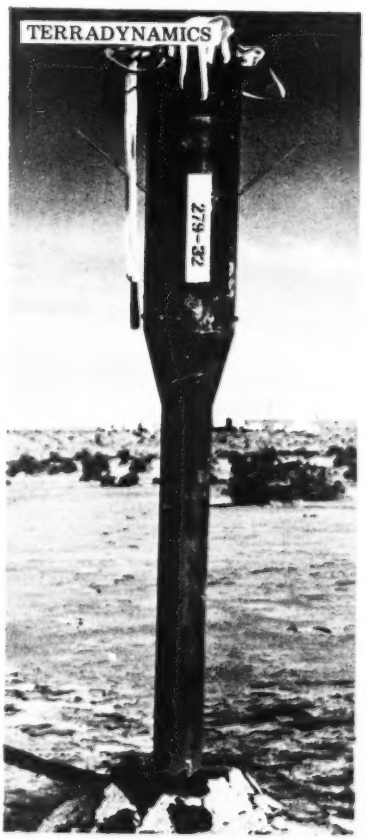
ORDER BY FILM NUMBER AND TITLE

ENGINEERING

CLEAN AIR IS A BREEZE . . . . . See page 10.

0143
FUNDAMENTALS OF MECHANICAL VIBRATION (1964). 29 minutes, color.
Suitable for Understanding Level-3.
Produced by the Sandia Corporation for the USAEC. For sale by NAC.
Discusses the simple systems of mechanical vibration, including spring mass, viscous coulomb, and solid damped systems. The various types of damping are illustrated by live demonstrations and animation. In addition, animated mathematical examples by Fourier are used to illustrate irregular forcing functions and their effects on engineering structures. The mathematical approach to solving composite displacement vibration problems is also discussed. (See also, RESPONSE TO MECHANICAL SHOCK.)

0425
RESPONSE TO MECHANICAL SHOCK (1968). 18 minutes, color.
Suitable for Understanding Level-3.
Produced by USAEC's Sandia Laboratory. For sale by NAC.
Illustrates several types of mechanical shock and shows the shock signature (acceleration as a function of time) generated by each shock. Through animation, the parameters used to define mechanical shock are shown: acceleration, velocity, and displacement, and the relationship and interdependence of these three functions are explained. The film illustrates the concept of a single-degree-of-freedom model, and shows how three different degrees of damping affect motion of the spring-mass system during shock response. With animated drawings, the film illustrates how the amplitude and



duration of a shock affect the response of a single-degree-of-freedom system; how shock response spectra for simple and complex shocks are derived; how shock response spectra may be used. (See also, FUNDAMENTALS OF MECHANICAL VIBRATION, page 41.)

HONORS: 14th International Exhibition of Scientific and Educational Films, Padua, Italy.

0421
TERRADYNAMICS (1968). 21 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Sandia Laboratories. For sale by NAC.

Documents the earth penetration program at Sandia Laboratories—a program concerned with determining the nature and composition of sub-surface soil using earth-penetrating, ballistic vehicles. With emphasis on current technology, the film shows early experimentation, the evolution of the program, the delivery techniques and design of several penetration vehicles, plus a typical recovery operation and post-recovery analysis. It also discusses the unique soil-motion studies conducted in a laboratory environment, substituting a cohesionless material for soil, which make it possible to photograph the displacement of individual particles during the penetration process; animation explains basic engineering concepts. The film ends with a brief discussion of the future applications of penetration technology.

FUELS, PROCESSING AND METALLURGY

0087
CERAMIC FUEL FABRICATION DEVELOPMENT FOR PRTR (1962). 26½ minutes, color.

Suitable for Understanding Level-3.

Produced by the General Electric Company for the USAEC. For sale by NAC.

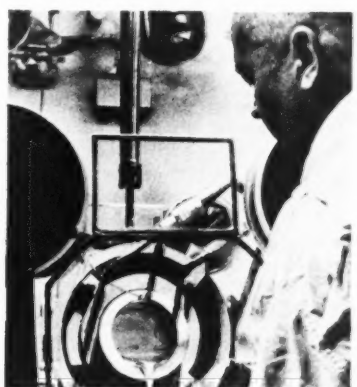
Gives a detailed technical explanation of three processes developed by Hanford laboratories for the fabrication of UO_2 fuel elements used in the Plutonium Recycle Test Reactor (PRTR). A brief summary of the purpose and history of the PRTR introduces studies of cold swaging, hot swaging, and vibrational compaction. Four significant phases of the fabrication processes are detailed in live and animated sequences: (1) ultrasonic testing of cladding tubes; (2) swaging to increase the bulk density of contained UO_2 powder; (3) magnetic-force resistance butt welding of fuel-rod end caps; and (4) final inspection steps, including the measurement of fuel density by gamma-ray attenuation. Vibrational compaction is shown to be particularly adapted to loading fuel into large fuel-element components and into preassembled multicomponent fuel elements. Hot swaging of induction heated rods containing powdered UO_2 is also illustrated.

0100
CURRENT METHODS IN PLUTONIUM FUEL FABRICATION (1965). 30 minutes. color.

Suitable for Understanding Level-3.

Produced by the General Electric Company for the USAEC. For sale by NAC.

Depicts the steps in the fabrication of plutonium–uranium ceramic fuel elements for the PRTR and EBWR at Hanford's Plutonium Fabrication Pilot Plant. Presented are the various types



CURRENT METHODS IN PLUTONIUM FUEL FABRICATION

of elements fabricated, the methods for the routine handling of plutonium and plutonium compounds, the preparation of plutonium dioxide from the metal, and its mixture with uranium dioxide. The necessity for densifying the powdered fuel is explained, and the steps involved in achieving high density particles by pneumatic impaction are illustrated in detail. Processes shown include pressing of the dense fuel from the impaction container, pulverizing, sieving into different size fractions, and blending into appropriate proportions for fuel rod fabrication either by vibrational compaction or swaging. A newer process, vibrational compaction, accomplishes similar results. The process is depicted in a live sequence which illustrates its rapidity, simplicity, and flexibility. Decontamination of loaded fuel rods and welding of the final end caps are followed by several unconventional testing techniques before assembly of the rods into the nineteen-rod nuclear fuel element cluster.

0109
EBR-II FUEL FACILITY (1964). 13 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Shows how, in this facility, coupled to the Experimental Breeder Reactor-II, highly radioactive fuel from the reactor is disassembled, reprocessed, and fabricated, without prior time-consuming radioactive cooling periods. How all facets of the system are designed for remote operation, repair and modification of equipment is also shown.

HONORS: 4th International Festival on Science Films, Lyon, France.

0408
INSIDE THE YANKEE CORE (1967). 32 minutes, color.

Suitable for Understanding Level-3.

Produced by Westinghouse Electric Corporation for the USAEC. For sale by Mode-Art Pictures, Inc.

Describes in detail the most extensive and complete post-irradiation program ever performed on an expended commercial power-reactor core—in a sense, a detailed autopsy on the heart of an atomic power plant. It shows the actual work that was done and explains why and how the first core of the Yankee Atomic Plant reactor was destructively analyzed. The film explains the procedure used to select fuel assemblies and individual fuel rods so that, with inherent core symmetries taken into account, a three dimensional map of measured burnup and isotopic content could be constructed and compared against predictions.

Fuel scheduled for examination is followed from the Yankee site at Rowe, Mass., to the Westinghouse Post-Irradiation Facility at Waltz Mill, Pa., where intact assemblies are inspected visually, measured, and gamma scanned. Selected fuel rods are shown being removed from the assemblies and transferred to the hot cells for destructive examination.

METALS FRONTIER

. . . . . See page 26.

0209
MICRODEFORMATION OF URANIUM (1958). 17 minutes, color.

Suitable for Understanding Level-3.

Produced by the General Electric Company, for the USAEC at the

Hanford Works, Richland, Washington. For sale by NAC.

Pictures the changes in the microstructure of uranium as a consequence of tensile loading and thermal treatments—studies accomplished by means of hot stage metallography. Formation of twin and kink bands, distortion at grain boundaries, fracturing, recrystallization, deformation due to thermal gradients, as well as microstructural changes associated with thermal cycling through the alpha-to-beta and beta-to-gamma transformations, are disclosed. The commentary discusses the microstructural changes as seen in the microscope.

0262

PLUTONIUM FUEL FABRICATION, EBR-I, MARK IV (1961). 10 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Fabrication of plutonium fuel and test pieces is complicated by consideration of criticality, pyrophoricity, and radioactive toxicity. This film describes the techniques and precautions observed in manufacturing fuel for the Experimental Breeder Reactor I (EBR-I), Mark IV. Throughout the production line, plutonium is exposed only in the filtered, recirculating helium atmosphere under a slightly negative pressure. Standard criticality features are observed. Entrance or exit from the line is accomplished through multiple air locks and sealed bags. Although the EBR-I Mark-IV fuel is experimental in nature, the handling techniques and precautions are generally applicable to plutonium fabrication.

0265

PLUTONIUM RECYCLE (1964). 17 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Explains that the nuclear-economic advantages of plutonium depend upon the performance of multiple recycle. Various aspects of the development for both thermal and fast reactors are presented, with particular emphasis on the fuel element technology, reactor use, and chemical reprocessing associated with mixed oxides of plutonium and uranium in thermal reactors.

0443

THE SAFE HANDLING OF ENRICHED URANIUM (In a U.S. Atomic Energy Commission Production Plant) (1969). 22 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by the Nuclear Division of Union Carbide Corp. (Y-12 Plant). For sale by NAC.

Filmed primarily at the USAEC's Y-12 Plant in Oak Ridge, the motion picture introduces new employees in nuclear production plants to the concept of nuclear fission and criticality, and explains the reasons for safety procedures that are observed in the handling of enriched uranium and other fissionable materials. The film will be understood by persons with or without a technical background. Its contents include: an animated sequence which explains the difference between U-238 and U-235, and the concepts of nuclear fission and criticality; a brief summary of the uses of enriched uranium; animated sequences explaining how criticality may be prevented by proper handling procedures; scenes of persons working with U-235 in various forms (gas, powder, metal, liquid) in several work areas; emergency procedures; and a few scenes of U-233 and plutonium work areas.

0339

SHEAR-LEACH PROCESS FOR SPENT NUCLEAR FUELS (1966). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Illustrates the development at Oak Ridge National Laboratory of the Shear–Leach Process, a mechanical method for reprocessing spent stainless steel or Zircaloy-2 clad power reactor fuels. The various parts of the equipment are portrayed, as well as the operation of the Shear–Leach with unirradiated fuel. The film also summarizes data obtained from various shearing and leaching tests conducted at ORNL.

0357

A STUDY OF GRAIN GROWTH IN BeO USING A NEW TRANSMITTED LIGHT HOT STAGE (1965). 16½ minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by Atomics International. For sale by NAC.

Film report (based on ceramics technology research conducted for the Fuels and Technology Branch, Division of Reactor Development and Technology, USAEC) depicts the design and operation of a new hot stage used with a polarizing microscope and transmitted light. Time-lapse color cinematography makes possible the observation of time-dependent reactions and structural changes in transparent crystalline materials at temperatures as high as 2000°C. Sequences are shown of studies of thin sections of beryllium oxide ceramics at about 1700°C in vacuum. Movement of pores and grain boundaries, grain growth, and surface evaporation effects were seen. The film describes the physical basis for some of the observations, and the determination of quantitative grain-growth kinetics from the photographic records.

HONORS: 5th International Festival of Science Films, Lyon, France.

0365

TERNARY PHASE DIAGRAM (1965). 7 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Depicts the development of a new and rapid technique for preparation of ternary phase diagrams required in the search for useful alloys. Since there are more than 4,000 combinations of three-element alloys which can be made from common metals alone, a comprehensive collection of such diagrams is needed. The technique shown for determining ternary phase alloy diagrams makes it possible to circumvent a previously tedious, time consuming, and costly research procedure.

HONORS: 4th International Festival of Scientific & Technical Films, Brussels, Belgium.

0368

THORIUM—U-233 UTILIZATION (1964). 13 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Discusses thorium-232 as fertile material, currently in use in three commercial power reactors, and the commercial fabrication of ceramic urania-thoria. Also shown are other fuel and reactor concepts being developed, such as the molten salt experiment, and the preparation of the first uranium-233 enriched thorium fuel by the Sol-Gel process.

0423

TRIP STEEL (1968). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

TRIP (transformation-induced-plasticity) is a new series of thermomechanically treated, highly alloyed steels combining high ductility and high strength. Tensile ductilities of 25% to 50% at strength levels above 200,000 psi are obtainable. The steels can be produced having wide ranges of composition and properties. Through closeup photography, the film shows the transformation that occurs in

TRIP steel as load is applied to both notched and tensile specimens. When specimens are pulled in tension, a surface upheaval is clearly evident by the appearance of horizontal lines. This upheaval or surface tilting is a consequence of the change in crystal structure of the steel occurring during straining. During this phase, the sample elongates to a surprising degree. During a later stage oblique lines, again representative of the transformation, travel up and down as the stress level is increased. This transformation redistributes the stress on the sample to temporarily prevent necking down and a break.

ORDER BY FILM NUMBER AND TITLE

GENEVA-1971 FILM TITLES

These 12 films were produced especially for professional audience showings at the Fourth International Conference on The Peaceful Uses of Atomic Energy, held in Geneva, Switzerland, 1971. List of titles and pages:

THE BITTER AND THE SWEET 16
DOORWAY TO DIAGNOSIS 45
ISOTOPES IN ENVIRONMENTAL CONTROL 7
NUCLEAR INNOVATIONS IN PROCESS CONTROL . . .44
NUCLEAR POWER IN THE UNITED STATES 53
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ZONAL ULTRACENTRIFUGE 48

INDUSTRIAL APPLICATIONS AND SPINOFF

ATOMS IN THE MARKET PLACE
. . . . . See page 10.

0173
INDUSTRIAL APPLICATIONS OF RADIOISOTOPES (1961). 57 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by the U. S. Army Pictorial Center. For sale by NAC.

Surveys the early widespread uses of radioisotopes throughout American industry. Three major areas of use are described: nuclear gauging (thickness, density, and level), radiography, and tracing—with various examples of each filmed at 26 sites nationwide, including the rubber industry, thin strip metal production, plastics, paper mills, nylons, food canning, cement, submarine construction, oil industry, automobiles, etc. Covered briefly are luminescence, static elimination, isotopic power, and uses of high-intensity radiation. Basic principles are explained by animation, followed by examples of in-plant uses. Benefits to the consumer and manufacturer are high-lighted. The excellent safety record is noted. The film, although of interest to a wide audience, is designed to acquaint industrial management with the versatility, economy, and ease with which radioisotope techniques can be adapted to plant requirements.

NO GREATER CHALLENGE
. . . . . See page 16.

THE NUCLEAR WITNESS: ACTIVATION ANALYSIS IN CRIME INVESTIGATION
. . . . . See page 11.

0467
NUCLEAR INNOVATIONS IN PROCESS CONTROL (1971). 17 minutes.

Suitable for Understanding Level-3.

Produced for the USAEC by Battelle Memorial Institute. For sale by NAC.

Depicts the great versatility and sophistication of nuclear methods that now are available for control of industrial processes and for nondestructive testing. The rapid response time of these techniques makes it possible to incorporate nuclear instrumentation into a loop that provides automatic control of paper production and into many steps of the processing of iron ore. The techniques are used in determining moisture content and in detecting impurities in a variety of materials, in determining alloy composition, in determining high roadbed density, in detecting defects in turbine blades, and in determining the basic crystal structure of a metal.

0483
PARACHUTE DEVELOPMENT AT SANDIA (1967). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by the Sandia Corporation for the USAEC. For sale by NAC.

Shows innovations developed at Sandia Laboratory to solve problems which arise when parachutes are used to recover rockets and other test vehicles traveling at supersonic speeds. Both live action and animation are used to show parachute parts, materials developed to improve these parts, an invention to aid high-speed parachute deployment, and innovations in parachute design and packing. Rare test footage taken by on-board rocket cameras is included.

0469

RADIATION PROCESSING: A New Industry (1971). 14 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by Battelle Memorial Institute. For sale by NAC.

Provides several examples of how the uses of radiation for industrial processing in the United States have increased rapidly during recent years. This increase is due to three factors: the development of new applications, the dissemination of knowledge about radiation processing, and the availability of convenient, high-level sources of electrons and gamma rays. Examples of radiation sterilization and chemical processing are shown. Electron beam treatment of durable-press fabrics is depicted publicly for the first time.

RADIOISOTOPE APPLICATIONS IN INDUSTRY

. . . . . See page35.

0307

RADIOISOTOPES: SAFE SERVANTS OF INDUSTRY (1963). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Molesworth Associates and Orleans Film Productions for the USAEC. For sale by NAC.

With emphasis on safety, this film surveys the widespread uses of radioisotopes in industry. Animated explanations of the principles involved in radioisotope gauging instruments, tracing and radiography are given. Applications of these principles are shown in various processes in the food industry, automotive research, road construction, heavy industry, oil refining and shipping, and system troubleshooting.

SANDIA SPINOFF

. . . . . See page 12.

TERRADYNAMICS

. . . . . See page 42.

TRIP STEEL

. . . . . See page 43.

MEDICINE

0004

ACROMEGALY: DIAGNOSIS, ETIOLOGY, THERAPY (1965). 23 minutes, color.

Suitable for Understanding Level-3.

Produced by Donner Laboratory and the USAEC's Lawrence Berkeley Laboratory. For sale by NAC. NOT cleared for television.

Describes the successful application of heavy particle radiation, obtained from high energy cyclotrons for treatment of the comparatively rare disease, acromegaly. Work at Donner Laboratory in Berkeley with the 184-inch synchrocyclotron for treatment of acromegalic patients is described. Detailed procedures for preparing the patient and irradiating the pituitary gland are shown. Symptoms, diagnosis, etiology, and medical history and medical treatments also are discussed.

HONORS: 3rd International Festival on Medicine & Public Health, Bologna, Italy.

CLEAN AIR IS A BREEZE

. . . . . See page 10.

0098

COUNTING WHOLE BODY RADIOACTIVITY (A Geneva—1964 film). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by Donner Laboratory and the USAEC's Lawrence Berkeley Laboratory at the University of California. For sale by NAC.

As sensitive instruments have been developed to measure lower and lower levels of radioactivity within the human body, these instruments have assumed a greater role in medical research and diagnosis. This film shows the Donner Laboratory Whole Body Counter, and outlines its program of use, with special reference to studies concerned with the iron metabolism of red blood cells and with calcium turnover in various diseases.

0104

DIAGNOSIS AND THERAPY WITH RADIATION (1964). 32 minutes, color.

Suitable for Understanding Level-3.

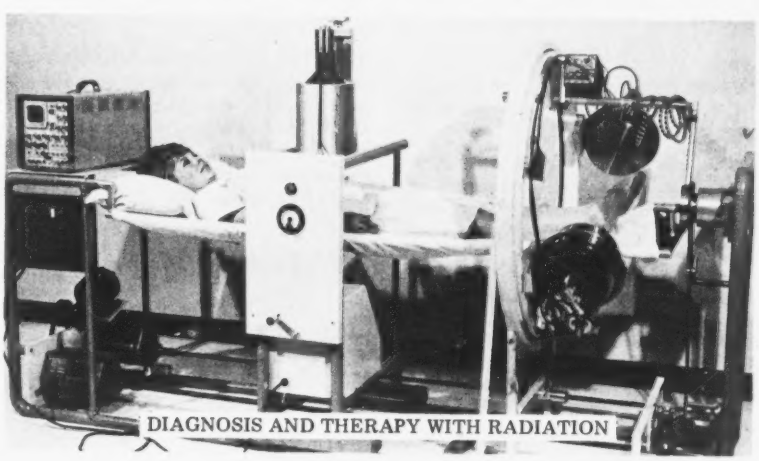
Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Describes radiation techniques of diagnosis and therapy which have become standard medical tools in the United States. The use of radioactive iodine for thyroid studies is routine, and many other metabolic measurements are common. Development of techniques to study kidney function and blood diseases have been particularly effective. Some clinics are now equipped to prepare and measure labeled gases and extremely short-lived isotopes. Diagnostic radiation levels have been reduced to the same order of magnitude as X-ray studied. By using appropriately labeled materials it is possible to visualize many organs which are difficult or impossible to examine with X-rays. This film describes current techniques of radiation therapy through doses of radioactive chemicals, implanting techniques, and the use of external beams.

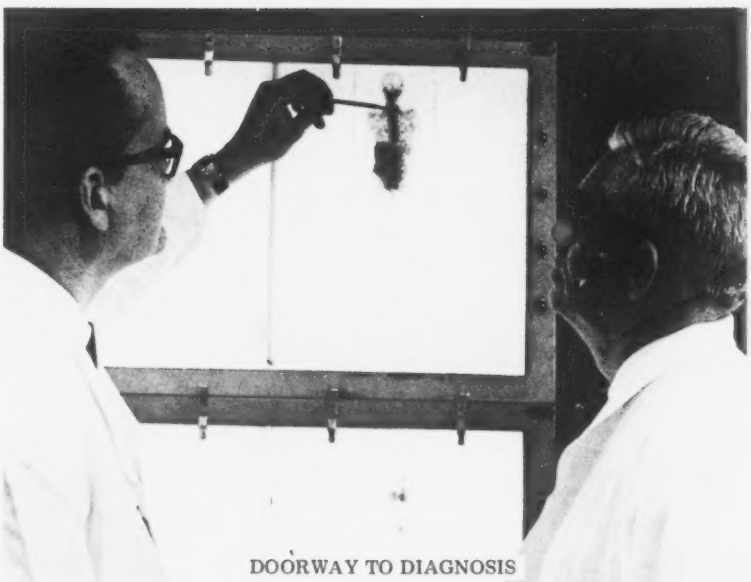
HONORS: 2nd International Festival of Red Cross & Health Films, Varna, Bulgaria; 4th ANZAAS International Exhibition of Science Films, Australia & New Zealand; 3rd International Festival on Medicine & Public Health, Bologna, Italy; International Exhibition of the Scientific—Didactic Film, Padua, Italy.

0465

DOORWAY TO DIAGNOSIS (1971). 24¼ minutes, color.



DIAGNOSIS AND THERAPY WITH RADIATION



DOORWAY TO DIAGNOSIS

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

One of the eternal challenges in the field of biological instrumentation has been the ability to detect and accurately measure radiation which occurs when nuclei undergo transitions. Recently some revolutionary improvements in such energy resolution have been made through the development of semiconductor detectors, image intensifiers, new rare earth phosphors and refined scanning devices.

All of these clinical advances have in part been financed by the United States Atomic Energy Commission, and their improved capability arms the physician with a much more sophisticated ability to detect and accurately measure the various manifestations of disease.

HONORS: 16th International Festival of Scientific and Educational Films, University of Padua, Italy.

0119

EXTRACORPOREAL IRRADIATION OF BLOOD AND LYMPH (1966). 7½ minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Brookhaven National Laboratory. For sale by NAC.

Shows how blood and/or lymph may be irradiated in a well-shielded gamma ray source outside of the body through a closed circuit of teflon tubes from artery to vein. The basic principle concerns the relative radiation resistance of erythrocytes (red blood cells) and the radiation sensitivity of the normal white cells (lymphocytes). The technique developed at Brookhaven National Laboratory, known as extracorporeal irradiation, is still experimental. It may prove to be of some therapeutic value to patients with leukemia and severe kidney disease.

Surgeons working in the operating room section of the experimental animal barn are shown fitting a calf with an external loop of teflon linking the carotid artery to a vein. The loop may be enlarged to include a cobalt-60 or a cesium-137 irradiation source.

A similar method for irradiation of lymph fluid outside the body employs an external plastic loop from thoracic lymphatic organs to a vein. The lymphocytes—an integral part of the foreign tissue rejection mechanism—may be depleted by extracorporeal irradiation, thus interfering with the normal body reaction of rejection of transfused blood, skin grafts, or organ transplants, etc. The final scenes show a human patient with chronic myelocytic leukemia receiving treatment.

HONORS: 5th ANZAAS International Scientific Film Exhibition, Australia & New Zealand; 4th International Festival of Scientific & Technical Films, Brussels, Belgium; 2nd International Festival of Red Cross and Health Films, Varna, Bulgaria.

ORDER BY FILM NUMBER AND TITLE

0159

HEAVY PARTICLE BEAMS IN MEDICINE (1964). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by Donner Laboratory and the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Gives a brief historical development of the medical uses of cyclotrons and shows the unique properties of accelerator-produced heavy particles both in investigative studies and in radiation therapy. Experience at the Donner Laboratory shows that this new tool of nuclear medicine when used in pituitary irradiation provides creditable results in the treatment of acromegaly, Cushing's disease, and the retardation of diabetic retinitis. In addition, the Bragg effect of alpha particle radiation is of increasing importance in direct treatment of tumors of the brain and soft tissue.

0214

MODIFICATION OF RADIATION INJURY IN MICE (1958). 10 minutes, color.

Suitable for Understanding Level-3.

Produced by the Jam Handy Organization, Detroit, for the USAEC. For sale by NAC.

Shows the effects on mice of chemical protection by mercaptoethylguanidine (MEG) before irradiation and bone marrow transplant after exposure to lethal doses of 900 r, as well as possible implications regarding treatment of some human diseases. The irradiation that kills 50 per cent of mice in 30 days can be doubled with MEG protection and nearly doubled with bone-marrow treatment. With chemical protection followed by bone-marrow treatment, the dose of irradiation that it takes to kill 50 per cent of mice in 30 days can nearly be tripled. MEG reduced the effect of a lethal dose of 900-r X irradiation on the bone marrow, spleen, thymus, and body weight by about a factor of 2. MEG is not effective when given after irradiation. Bone-marrow injection was primarily responsible for replacing the destroyed bone marrow. It is not effective when given before irradiation. In combined treatment, the animal received the advantages of both types of therapy and survived much greater exposure.

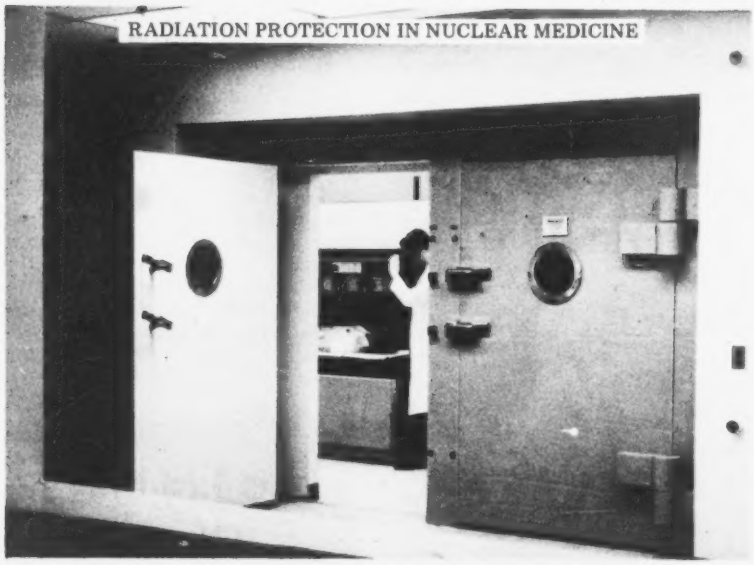
0298

RADIATION PROTECTION IN NUCLEAR MEDICINE (1962). 45 minutes, color.

Suitable for Understanding Level-3.

Produced by Fordel Films, for the Bureau of Medicine and Surgery of the U. S. Navy. For sale by NAC.

Demonstrates the procedures devised for naval hospitals to protect against the gamma radiation emitted from materials used in radiation therapy. However, its principles are applicable in all hospitals. The practices demonstrated are based on three principles established at the outset. The film



explains the nature of gamma radiation relative to how time, distance, and shielding are used to provide protection from its harmful effects. Time is considered in two ways: (1) the half life of the radioactive materials used; and, (2) the speed in handling them. The film shows the continuous application of these principles from the moment radioactive materials are received at a hospital, through their storage, their preparation for use, their therapeutic administration, the nursing care of radioactive patients, and the disposal of radioactive human waste. The film details the special techniques and equipment used in the handling of radium and radioactive gold, iodine, and iridium as representing the variety of such materials that hospital personnel encounter and the consequent variations in time, distance, and shielding employed as protection against them.

ORDER BY FILM NUMBER AND TITLE

0442

RADIATION ACCIDENT PATIENTS (1969). 17 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC and for sale by the Motion Picture Service, U. S. Department of Agriculture. NOT cleared for television.

The film is designed for the training of rescue workers, nurses, therapists, hospital administrators, physicians, police and firemen. It emphasizes that, despite the outstanding safety record of the nuclear energy industry, the anticipated rapid growth of atomic workers in the next decade could result in an increase of incidents involving possible radioactive contamination, which can be effectively and safety handled within existing medical facilities.

In a series of simulated action episodes depicting accidents, the film shows the techniques for proper handling of radiation accident patients; how to use simple detection instruments; radiation injury aspects of first aid. Based on the credo, "Never let fear compromise good medicine," the film points out that the unfounded fears of some medical and paramedical personnel of radiation and possible contamination must not be allowed to close the door on assistance to radiation patients. The film helps audiences understand that radiation cases have parallels in routine rescue squad and hospital experiences.

HONORS: 27th National Committee on Safety, Chicago, Illinois.

RADIOISOTOPE APPLICATIONS IN MEDICINE . . . See page 36.

0470

THE RADIOISOTOPE POWERED CARDIAC PACEMAKER (1971). 21½ minutes, color.

Suitable for Understanding Level-3.

THE RADIOISOTOPE POWERED CARDIAC PACEMAKER

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

NOT cleared for television.

One of the relatively common diseases that disrupt a normal heart is "heart-block." This occurs when the natural pacemaker of the heart no longer generates the required electrical impulses to contract the ventricles. There are presently more than 40,000 persons in the United States who have been greatly assisted by the use of battery-powered artificial heart pacers and each year an additional 5,000 patients receive such devices.

In three years the United States Atomic Energy Commission in collaboration with the National Institutes of Health has successfully developed an isotope powered pacemaker. The nuclear pacer promises a lifetime of ten years or more and removes the risk and expense of frequent surgical replacement now experienced with battery powered pacers. This film depicts the entire fabrication and lifetime testing of the nuclear powered pacer and witnesses one of the complete implantations of the device in a dog at the National Institutes of Health.

HONORS: Chris Certificate in Medicine, 19th Columbus Film Festival, Ohio.

0335

THE SCINTILLATION CAMERA (1964). 10 minutes, color.

Suitable for Understanding Level-3.

Produced by Donner Laboratory and the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

In order to visualize the location of gamma-emitting isotopes within the human body for medical diagnostic purposes, the scintillation camera was developed at the Donner Laboratory. Using animation, this technical film describes this equipment and explains the application of the method for studying thyroid and kidney function disorders. It also describes a modified apparatus for use with positron-emitting isotopes which has been developed and finds a particular advantage in diagnosis of brain tumors.

0471

SHORT-LIVED RADIOISOTOPES IN NUCLEAR MEDICINE (1971). 27 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

The recent surge in the use of radioisotopes in nuclear medicine owes much of its impetus to the development of new improved scanning instrumentation.

THE ZONAL ULTRACENTRIFUGE

The film describes the development of a Technetium-99*m* generator at Brookhaven and its medical application at the Argonne Cancer Research Hospital. It also touches upon the more recent methods of producing new experimental short-lived isotopes in High Flux Reactors and medical cyclotrons. The refinement of radioisotope scanning techniques is also discussed, and capsule reports are made on the Mark III brain scanner, the 16-inch Anger camera, and the depth perception ability of the multiplane tomographic scanner. All these refinements offer the physician a better diagnostic picture faster and with the lowest radiation burden to the patient.

0475

THE ZONAL ULTRACENTRIFUGE (1971). 6 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

In man's continual attack on human diseases molecular biologists have begun to employ new zonal ultracentrifuges which are capable of the rapid fractionization of large volumes of cell constituents. These centrifuges were developed out of the Molecular Anatomy on Man Program at the Oak Ridge National Laboratory under the direction of Dr. Norman G. Anderson. This film depicts the loading, separation and unloading operation of the new centrifuge and touches upon their role in the purification of viruses using improved operation capabilities.

NUCLEAR WEAPONS TESTING AND DETECTION

ENVIRONMENTAL TESTING AT SANDIA . . . . See page 17.

PERSIMMON: A NUCLEAR PHYSICS EXPERIMENT . . . . . See page 51.

PROJECT SHOAL . . . . . See page 17.

RETURN TO BIKINI . . . . . See page 2.

0389

VELA PROGRAM: SATELLITE DETECTION SYSTEM (1964). 17½ minutes, color.

Suitable for Understanding Level-3.

Produced by the Sandia Corporation for the Advanced Research Projects Agency of the Department of Defense and the USAEC. For sale by NAC. NOT cleared for television.

Explains the nature of the atmosphere surrounding our planet and the problems involved in analyzing nuclear explosions beyond the earth's atmosphere. Describing the basic circuits and problems involved in developing a series of satellites for detecting nuclear radiation, it further illustrates the manufacturing and testing of the detection system and summarizes the future of the satellite detection program.

PEACEFUL NUCLEAR EXPLOSIVES

PROJECT GASBUGGY . . . . . See page 19.

0283

PROJECT GNOME TECHNICAL REPORT (1964). 19 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Presents the technical aspects of Project Gnome, the first experiment of the U. S. Atomic Energy Commission's Plowshare Program to study peaceful applications of nuclear explosives. Methods of implementation of the basic goals are illustrated by animation. Various measurements—including those of the phenomenology of a nuclear explosion in a dry salt medium, power and isotope production studies, and neutron physics experiments—are discussed. Re-entry into the cavity created by the explosion is shown. Significance of the seismic signals produced, isotope studies, and neutron physics experiments is covered.

0331

SAFETY IN THE PLOWSHARE PROGRAM (1966). 22 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC. For sale by NAC.

Documents the means taken to ensure public safety during experiments to develop peaceful uses of nuclear explosives.

Nuclear explosives, precisely controlled, are powerful, compact and relatively inexpensive sources of energy which may help produce oil and gas, mine minerals, dig harbors, canals, and mountain passes, and provide important scientific knowledge. Each of these applications uses one or more of the effects of nuclear explosions: heat, explosive force and radiation. These effects, their safety implications, and the precautions taken for public safety are demonstrated.

The film explains that technical advances in the design of Plowshare explosives make it possible to reduce to a very small amount the radioactivity produced by an explosion. In cratering explosions, methods of emplacing the explosive underground result in the release to the atmosphere of only a small part of the radioactivity produced. Contamination of underground water supplies does not appear to be a major problem.

Other effects of nuclear explosions—ground shock, air blast, and dust clouds—require safety procedures similar to those taken in many large-scale conventional construction projects. Site choice, weather selection, and, in certain cases, temporary relocation of inhabitants are precautions taken to ensure the public safety.

0473

TO DEVELOP PEACEFUL APPLICATIONS FOR NUCLEAR EXPLOSIVES (1971). 14¾ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by Jack Williamson, Newport Beach, California. For sale by NAC.

The film emphasizes the complex laboratory and field research procedures which support (and the stringent requirements which govern) all nuclear explosive engineering experiments in the U. S. program called "Plowshare."

Voices of several experts in the U. S. peaceful nuclear energy program describe objectives in their respective areas of responsibility, with reference to two recent experiments, Gasbuggy and Rulison, in the nuclear stimulation of natural gas fields.

PHYSICS, FUSION AND CHEMISTRY

ALPHA, BETA, AND GAMMA . . . . . See page 35.

0476

ANALYSIS OF NUCLEON–NUCLEON SCATTERING EXPERIMENTS (1961). 50 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

This filmed lecture by Dr. H. Pierre Noyes is intended primarily for graduate courses in nuclear physics. It gives an overall picture of the route followed in passing from single-, double-, and triple-scattering experiments to a unique description of the scattering matrix in terms of phase shifts. Topics mentioned: relation between scattering cross section and scattering amplitude; expression of conservation of angular momentum and of number of particles by writing the scattering amplitude in terms of phase shifts; relation between range of the force and the number of angular-momentum states present; relation between quantum mass and range of force; inclusion of one-pion exchange effects in the phase-shift analysis; the number of independent scattering experiments using two spin-½ particles, illustrated by three-dimensional models for the experiments P, D, R, A, C_{nn} and C_{kp}; and problems encountered in trying to determine the best phase-shift solution in terms of least squares. (See also DISPERSION THEORY APPROACH TO NUCLEON–NUCLEON SCATTERING on this page.)

THE ATOM IN PHYSICAL SCIENCE . . . . . See page 35.

ATOMIC PHYSICS . . . . . See page 24.

0103

DEVELOPMENT AND FABRICATION OF HFIR TARGET ELEMENTS (1967). 14½ minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Depicts the design and development of High Flux Isotope Reactor target elements—and the development of suitable manufacturing processes—for the nation's transuranium program. The picture shows the remote manufacture of target elements at Oak Ridge National Laboratory's Transuranium Processing Plant. These elements, after irradiation in HFIR, are returned to TRU and chemically processed for separation of the desired transuranium isotopes.

0477

DISPERSION THEORY APPROACH TO NUCLEON–NUCLEON SCATTERING (1961). 45 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

This filmed technical lecture by Dr. H. Pierre Noyes, which outlines some of the main ideas and techniques used in the calculation of the nucleon–nucleon scattering matrix from its analytic properties and unitarity, is suitable for use at the graduate student-staff level. It presupposes some familiarity with scattering solutions of the nonrelativistic Schroedinger equation and Cauchy's theorem and an acquaintance with Feynman diagrams. Topics discussed: (1) Solution of the S-wave Schroedinger equation for a superposition of exponential or Yukawa potentials by conversion to a Volterra equation, using the method of André Martin. (2) Solution of the same equation by partial-wave-dispersion relations using the N/D method; construction of the potential from the discontinuity in the partial-wave amplitude. (3) The Mandelstam representation for potential scattering and construction of the double-spectral function. (4) Relation between the field–theoretic amplitude and the nonrelativistic scattering amplitude. (5) Relation of nucleon–nucleon scattering to the nucleon–antinucleon amplitude, pion–nucleon scattering, pion–pion scattering, and nucleon electromagnetic structure. (See also ANALYSIS OF NUCLEON–NUCLEON SCATTERING EXPERIMENTS on this page.)

ORDER BY FILM NUMBER AND TITLE

0478

FABRICATION OF THE ACCELERATOR STRUCTURE (1965). 40 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Stanford Linear Accelerator Center. For sale by NAC.

Describes the methods used in the fabrication of the accelerating structure and associated components for the USAEC's two-mile linear electron accelerator at Stanford University. The accelerator pipe, or disk-loaded waveguide, through which the electron beam travels, is manufactured from oxygen-free, high-conductivity copper cylinders and disks. The film shows in detail the steps followed in brazing together of 84 cylinders and 85 disks to form a basic 10-foot section of the accelerating structure. Significant steps shown and described include: machining of cylinders and disks; annealing of parts; fabrication of input and output coupler sub-assemblies; brazing of a 10-foot section in a unique, hydrogen–oxygen, split-ring burner flame furnace; of tuning and high power of testing of a section using the full power of a klystron tube; and, the mounting of four 10-foot sections and associated components.

HONORS: 4th ANZAAS International Scientific Film Exhibition, Australia & New Zealand; International Exhibition of the Scientific—Didactic Film, Padua, Italy.

0426
FIRST CHEMICAL SEPARATION OF LAWRENCIUM (1968). 17 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Shows four important factors that made the chemical separation of lawrencium possible: (1) preparation of a target to make ^{256}Lw; (2) production of ^{256}Lw with a half life of thirty seconds; (3) the unique transfer equipment; and (4) the chemical separation performed in about forty-five seconds.

The scenes of the actual preparation of the target in a glove box include the final separation chemistry, the plating of ^{249}Cf on a beryllium foil and inspection of the target. Next, the Heavy Ion Linear Accelerator and the target area are shown and explained, as well as the special equipment to transfer the atom of ^{256}Lw from the target area to the chemistry bench.

The film shows the preparation for the chemical separation and the rapid performance of the chemical separation before the radioactive lawrencium transmutates into another element. Finally, a detailed description of the separation chemistry, as well as an explanation of the overall experiment and its significance, is given by the research chemist.

0145
FUSION RESEARCH (1964). 22 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Describes the nature of thermonuclear research as illustrated by many of the current investigations of plasma production and confinement. The major obstacles to success are plasma oscillations and instabilities which result in plasma loss from the magnetic containers. The film gives a qualitative description of some of the instabilities, of energy loss through charge exchange and radiation due to contaminants; and also describes plasma measurements, which are now very sophisticated. Several research devices in the United States on which progress has been encouraging are described in the film.

HONORS: "Best Film in Scientific Research," 2nd International Festival of Technical and Industrial Films, Belgium; International Festival of Technical & Scientific Films, Belgrade, Yugoslavia; International Exhibition of the Scientific—Didactic Film, Padua, Italy.

0162
HIGH ENERGY PHYSICS RESEARCH (1964). 23 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For Sale by NAC.

Many very high energy accelerators, scattered throughout the world, are being used to probe the characteristics of subatomic particles. The new particles and their interactions have brought about reconsideration and revision of some of the fundamental laws of physics. This technical film indicates our current understanding of subnuclear particles, nuclear forces, and surveys the status of high energy physics research in the United States. This includes the general types of accelerators and the devices used for particle detection and analysis, the efforts to organize the data into a unified general theory, the difficulty of this problem, and the many remaining questions.

HONORS: 4th International Festival on Science Films, Lyon, France; Poznan Pullen Fair, Poland.

0181
INTRODUCTION TO HIGH VACUUM (1961). 18 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Brookhaven National Laboratory and Audio Productions for the USAEC and the American Vacuum Society. For sale by Audio Productions.

Defines high vacuum and shows how it is produced and measured. Information is given on the contributions of Torricelli and Von Guericke to vacuum physics; how vacuum is expressed (millimeters of mercury, Torr, particles per cubic centimeter); flow characteristics (viscous and molecular) of gases under vacuum and their influences on vacuum techniques; mechanical and nonmechanical vacuum pumps and their principles of operation (oil-seal rotary, dry-seal roots, diffusion, and getter-ion types); mechanical and nonmechanical vacuum gauges and their principles of operation (McLeod mercury, thermocouple, and ionization); and typical examples of applications of high-vacuum techniques in product manufacture and in scientific research (freeze-drying process, thin-film-evaporation process, and thermonuclear experiments).

0446
A JOURNAL OF PLUTONIUM (1969). 47 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Largely by interview, this film is a chronicle of the men and events that led to the discovery, separation and large scale production of plutonium—the most important new element discovered in the last half century. Through the personal reminiscences of Dr. Glenn T. Seaborg, Dr. Emilio Segre, Burris Cunningham and others, the personal story of the men who discovered plutonium, purified and weighed it, and eventually produced it on a large industrial scale for the wartime Manhattan Project is told. Only four years elapsed between the discovery of the new transuranium element and its first isolation in quantity—truly an unprecedented chapter in the basic history of chemistry. Since the end of World War II, plutonium has also played a very active role in the peaceful uses of atomic energy—as the nuclear fuel in a fast breeder reactor, as the power source for small, compact isotopic generators in space, and as the potential power source for heart pacers and artificial hearts.

0216
NEUTRON ACTIVATION (1964). 8 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

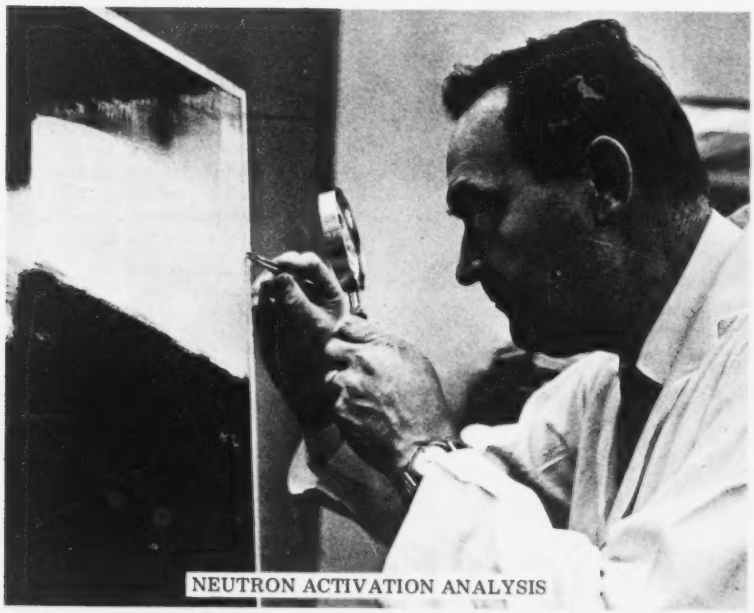
When a substance is irradiated with neutrons, minute quantities of radioactive elements are produced. By measuring the quantity and energy spectrum of the radiation produced, we can obtain an extremely sensitive and precise measurement of the elements present. This technical film describes the general techniques, applications, and sensitivities of this powerful analytical tool.

0217
NEUTRON ACTIVATION ANALYSIS (1964). 40 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by the General Atomic Division, General Dynamics. For sale by McNamara Productions.

Deals with the nature, potentialities, and applications of neutron activation analysis—a highly sensitive and powerful analytical technique that has grown out of the study of peaceful uses of nuclear energy. It is a method of analyzing samples for various elements by bombarding them with neutrons to make some of the elements radioactive, and then identifying and measuring the induced radioactivities to complete the quantitative analysis. The film shows the kinds of neutron sources used (isotopic, accelerator, and



NEUTRON ACTIVATION ANALYSIS

nuclear reactor), the latest counting techniques employed (especially those of multichannel gamma-ray spectrometry and spectrum stripping).

Both activations with thermal neutrons and with fast neutrons are shown. The purely instrumental, nondestructive form of the method and also the form involving radiochemical separations with carriers are illustrated. The microgram-to-milligram sensitivities attainable with low-cost accelerator neutron sources and the sub-nanogram to microgram sensitivities achieved with a modern pool-type research reactor are reviewed. The high speed of the instrumental method is stressed, and the possibilities of automation and computer calculation are presented. Interesting examples of recent applications of the method in the fields of scientific crime detection, geology and geochemistry, agriculture, medicine, the petroleum and chemical industries, and the semiconductor industry are shown.

HONORS: ANZAAS 3rd International Scientific Film Festival, Australia & New Zealand.

0218

NEUTRON DIFFRACTION (1964). 9 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC Argonne National Laboratory. For sale by NAC.

The wavelengths of thermal neutrons are comparable to X rays used in the study of crystal structures and produce similar diffraction effects. Since the scattering processes are different, neutron diffraction studies provide information which cannot be obtained by other methods. They are particularly useful for determining the positions of light atoms in the crystal structure and provide a unique technique for the study of magnetic orientation. This technical film describes the principles of neutron diffraction and indicates new fields of investigation which previously were considered not feasible.

0219

NEUTRON IMAGE DETECTOR (1965). 5½ minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Argonne National Laboratory. For sale by NAC.

In a number of areas of nuclear research it is necessary to detect and visualize the distribution of neutrons. Like X rays, the penetrating characteristics of neutrons can be used for radiography. However, the absorption characteristics of neutrons and X rays are quite different and this makes neutron radiography a very valuable technique. The film describes a new vacuum tube developed by the Argonne National Laboratory Metallurgy Division and the Rauland Corporation, a subsidiary of Zenith Radio Corporation. The tube contains a neutron-sensitive screen one foot in diameter. It produces a brilliant image which may be viewed with a closed circuit television camera. Applications of the tube to neutron radiography and neutron motion pictures are illustrated.

NUCLEAR FINGERPRINTING OF ANCIENT POTTERY See page 26.

NUCLEAR REACTIONS . . . . . See page 35.

0411

PERSIMMON: A NUCLEAR PHYSICS EXPERIMENT (1967). 16 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Los Alamos Scientific Laboratory. For sale by NAC.

For several years, the Los Alamos Scientific Laboratory has been using the intense burst of neutrons produced by the underground detonation of a nuclear explosive to perform a variety of nuclear physics experiments. The basic argument in favor of such experiments is that a relatively small nuclear detonation will produce the same quantity of neutrons, in a fraction of a second, that would take a laboratory accelerator hundreds of years to produce. Thus, experiments requiring a very high neutron flux, or a hopelessly long-running time on an accelerator, become feasible with a nuclear explosion as the neutron source. The motion picture presents and discusses the various experiments that comprised the Persimmon event and climaxes with the actual detonation of the nuclear explosive and the consequential collapse and cratering of the ground above it.

PROPERTIES OF RADIATION (Understanding the Atom Series) . . . . See page 36.

RADIATION AND MATTER . . . . . See page 36.

ORDER BY FILM NUMBER AND TITLE

0295

RADIATION EFFECTS IN CHEMISTRY (1964). 13 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

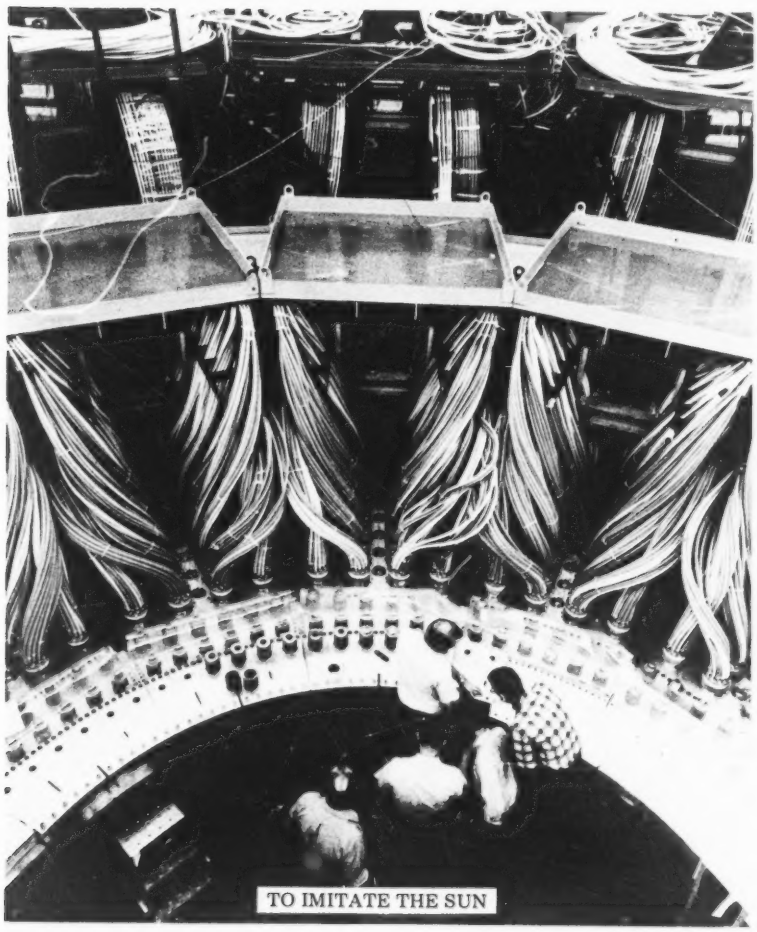
Explains that radiation initiates a wide variety of chemical reactions. But the fundamental mechanisms which produce these effects are still under investigation. Within a few nanoseconds after irradiation, a variety of chemical substances are produced which are then available to participate in subsequent reactions. The experimental study of this process requires extremely sensitive and high-speed techniques—spectrometry, electron spin resonance techniques, etc.

0474

TO IMITATE THE SUN (1971). 33 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.



TO IMITATE THE SUN

One of the rarest basic research programs now gripping the minds of nuclear physicists the world over is controlled thermonuclear fusion. After more than a quarter century of research and experiment, scientists believe they are close to demonstrating the scientific feasibility of the fusion concept.

This film depicts the theoretical challenge of such controlled fusion and describes many of the research machines that are being used to investigate plasmas of thermonuclear regimes. It also touches upon what environmental and economic advantages may accrue from future fusion power reactors. The film also includes descriptions of the four major American fusion devices, Two-X-Two, Astron, Scyllac and ORMAK, as well as discussions on the modeling of plasmas by such internal ring machines as the D.C. Octupole and the Spherator.

HONORS: 1971 Chicago International Film Festival, Illinois; 16th International Festival of Scientific and Educational Film, University of Padua, Italy.

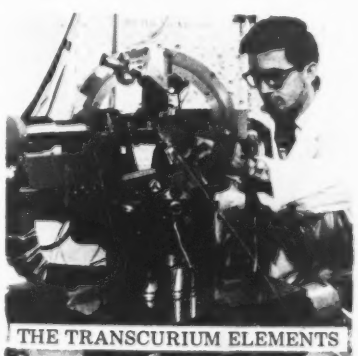
ORDER BY FILM NUMBER AND TITLE

0378

TRANSCURIUM ELEMENTS: SYNTHESIS, SEPARATION AND RESEARCH (1965). 31 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.



THE TRANSCURIUM ELEMENTS

Describes three basic transcurium research experiments at the USAEC's Lawrence Radiation Laboratory by University of California scientists. Transcurium element research is part of a continuing program at the laboratory designed to further the knowledge of the chemical nature and nuclear structure of the recently discovered heavy elements, berkelium, californium, einsteinium and fermium.

The specialized separation work in research was performed at the laboratory after the elements were synthesized in the Materials Testing Reactor at the USAEC's National Reactor Testing Station in Idaho. The film shows the capsule containing a one-gram mixture of plutonium-242, americium-243, and curium-244 being released from the reactor after four years of irradiation in the highest neutron flux region of the core. The process of transmuting one element to the next heavier by neutron capture is illustrated in the film.

The chemical separation techniques and equipment are explained during operational tests. Photography through the observation window depicts some of the significant steps in the chemical separation. A dramatic part of the separation occurs when the curium can be seen separating from other elements by its luminescence or light generated by radioactivity.

The first research experiment illustrates the discovery of a new isotope of fermium of mass 257. The next experiment shows the measurement of the neutron induced fission of einsteinium-253. The final experiment explains how 70 per cent of the world's supply of purified berkelium was formed into a crystal to concentrate its self-luminescent light.

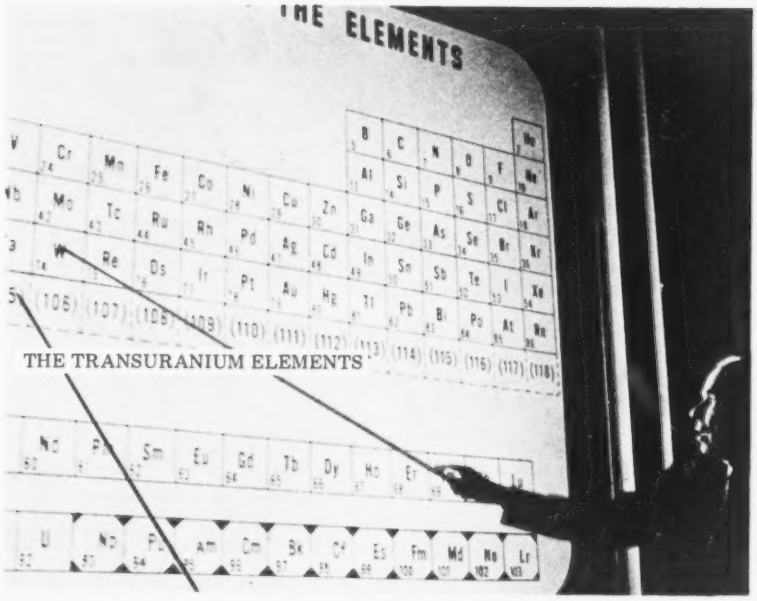
HONORS: First Prize, 3rd International Film Festival of Industrial & Commercial Films, Brussels, Belgium; 5th International Festival of Science Films, Lyon, France; 12th International Nuclear Congress, Rome, Italy; 3rd International Festival of Films on Science, Toronto, Canada; International Exhibition of the Scientific—Didactic Film, Padua, Italy; American Film Festival, New York City, N. Y.; Chris Award, Columbus Film Festival, Ohio; Meritorious Participation, San Francisco Film Festival, California.

0419

THE TRANSURANIUM ELEMENTS (1968). Part I: 58 minutes; Part II: 70½ minutes; black and white.

Suitable for Understanding Level-3.

Produced by the USAEC, based on videotape made at the University of Sydney, Australia. For sale by NAC.



This two-part professional level lecture by Dr. Glenn T. Seaborg, Nobel Laureate and former Chairman of the U. S. Atomic Energy Commission, was produced from a TV tape recorded at the Tenth Anniversary Summer Science School at the University of Sydney, Australia, in January 1967. Dr. Seaborg describes the work leading to the discovery of all the known transuranium elements—from element 93 through element 104. The lectures are illustrated with slides explaining the production of these new, man-made elements. Some practical applications of transuranium elements and the possibility of making even newer, very heavy elements are also discussed. This film provides the opportunity of seeing and hearing a famous scientist personally describe some important nuclear age discoveries in which he played a major role.

HONORS: ANZAAS 4th International Scientific Film Exhibition, Australia & New Zealand.

0402

XENON TETRAFLUORIDE (1962). 5½ minutes, color.

Suitable for Understanding Level-5.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Shows how chemists at Argonne National Laboratory have succeeded in making xenon combine chemically with fluorine—the first combination of xenon and one other element, a chemical reaction previously thought to be impossible—which has opened up a new area for the study of chemical bonding. The film shows the preparation of the compound in the laboratory under special conditions of temperature and pressure. The ingredients are sealed in a glass vacuum tube and first heated to 400°C for one hour, then cooled rapidly to room temperature. Crystals of xenon tetrafluoride—the new compound—grow before your eyes. Tests to substantiate the exact nature of the compound are illustrated, and future experiments on forming compounds with rare gases are discussed.

HONORS: ANZAAS 3rd International Scientific Film Festival, Australia & New Zealand.

ORDER BY FILM NUMBER AND TITLE

POWER REACTORS

0054

ATOMIC VENTURE (1961). 23½ minutes, color.

Suitable for Understanding Level-3.

Produced by, and for sale by, the General Electric Company.

Covers the design and development of a large dual-cycle boiling-water reactor—the 180,000-kw Dresden Nuclear Power Station—built by General Electric Company (GE) for the Commonwealth Edison Company, Chicago, and the Nuclear Power Group, Inc., and the history of the project from its beginning in 1955 to its completion in 1959. The film shows major stages of development, including clearance of the site 47 miles southwest of Chicago; ground-breaking; construction of foundations, sphere, and other buildings; manufacture of the containment vessel and fuel; shipment and arrival of major components; installation of the reactor core, reactor vessel, and turbine-generator; testing of completed installations; and the station's "going critical." The film also includes scenes relating to development work for Dresden carried out at GE's Vallecitos Atomic Laboratory near Pleasanton, Calif.

EBR-2 FUEL FACILITY

. . . . . See page 42.

0417

MOLTEN SALT REACTOR EXPERIMENT (1968). 20 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Oak Ridge National Laboratory. For sale by NAC.

Describes the design, construction and operation of the Molten Salt Reactor Experiment (MSRE), which is a fluid fuel, rather than solid fuel reactor. Extensive animation is used to illustrate what takes place in the reactor system during operation. Developmental work prior to fabricating many of the reactor's major components, such as the reactor vessel and salt-to-air radiator, also is presented. A portion of the film is devoted to a discussion of the composition and circulation path of the molten salt fuel as well as the reactor cooling and control systems. It is pointed out that, based upon the successful operation of the MSRE, thermal breeder reactors could have many practical construction and operating advantages, and that molten-salt reactors appear to be very attractive thermal breeders.

0468

NUCLEAR POWER IN THE UNITED STATES (1971). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

By the year 2000, it is estimated that more than half of all the electrical power needs of the United States will come from nuclear energy power plants. To meet these projected demands for yet more power, the United States Atomic Energy Commission has spent more than two decades in the development of thermal reactors as well as performing research on various advanced reactor concepts.

This film depicts the energy philosophy of the Commission and describes the implementation of plutonium-recycle programs and the thrust of the liquid metal fast breeder. The entire

spectrum of the nuclear power industry is touched upon including SEFOR, LMEC, FFTF, EBR-II and the work being performed at Enrico Fermi, Dresden, Hanford and Shippingport. The film not only discusses the liquid metal fast breeder, but tells of the work being done on other advanced reactor concepts such as the high temperature gas cooled reactor, the molten salt breeder and the low gain thermal breeder.

0267
PM-3A NUCLEAR POWER PLANT—ANTARCTICA (1963). 20 minutes, color.

Suitable for Understanding Level-3.

Produced by the Martin Company for the USAEC. For sale by NAC.

The film-story of the 1500-kilowatt nuclear power station built, under contract to USAEC, for operation by the Navy at McMurdo Station, Antarctic headquarters for the joint Navy—National Science Foundation Antarctic Research Project. PM-3A, the first atomic power station in the bleak Antarctic, supplies electric power and space heating for the isolated station. Use of nuclear power reduces the massive amounts of fuel oil for generating electricity that must be brought 11,000 miles by American tankers. PM-3A was designed, fabricated, and tested in 14 months. Details are given on the plant's pressure vessel, coolant, nuclear fuel, control rods, switchgear, heat-transfer equipment, turbogenerator, and many other major components. We see shots of the erection and testing of the reactor in the States, site preparation by Seabees in the Antarctic, erection and testing of the reactor at McMurdo, safety aspects, and achievement of criticality.

0314
REACTOR SAFETY RESEARCH (1964). 15 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Shows that conservative design is characteristic of nuclear power reactors, with elaborate safeguards to prevent the improbable accident. It points out that through reactor safety research the mechanisms of abnormal behavior, fission product release, chemical reactions, containment, and vapor cleanup systems are better defined, providing a basis for improvement in design features and reduction of costs.

0456
RETIREMENT OF THE HALLAM NUCLEAR POWER FACILITY (1970). 35 minutes, color. NOT cleared for television.

Suitable for Understanding Level-3.

Produced by Atomics International for USAEC. For sale by Color Reproduction Co.

This technical film shows the implementation of the AEC plan for decommissioning the 254 Mwt sodium cooled graphite-moderated nuclear power reactor located at Nebraska Public Power District's Sheldon Station. The accomplishment of the retirement left the remaining structures non-hazardous and completely contained with no requirements for licensing or maintenance. Stressing the safety procedures necessary for the handling of sodium and radioactive materials, the film shows: disposal of irradiated fuel, disposal of bulk sodium, reaction of residual primary sodium, disposition of contaminated material, removal of reusable equipment, demolition of the reactor building, and sealing of reactor and remaining structures.

THORIUM–U^{233} UTILIZATION
. . . . . See page 43.

RESEARCH AND TEST REACTORS

0005
ADVANCED TEST REACTOR (1964). 9 minutes, color.

Suitable for Understanding Level-3.

Produced by Ebasco Services, Inc., Babcock & Wilcox Co., and Phillips Petroleum Co. For sale by NAC.

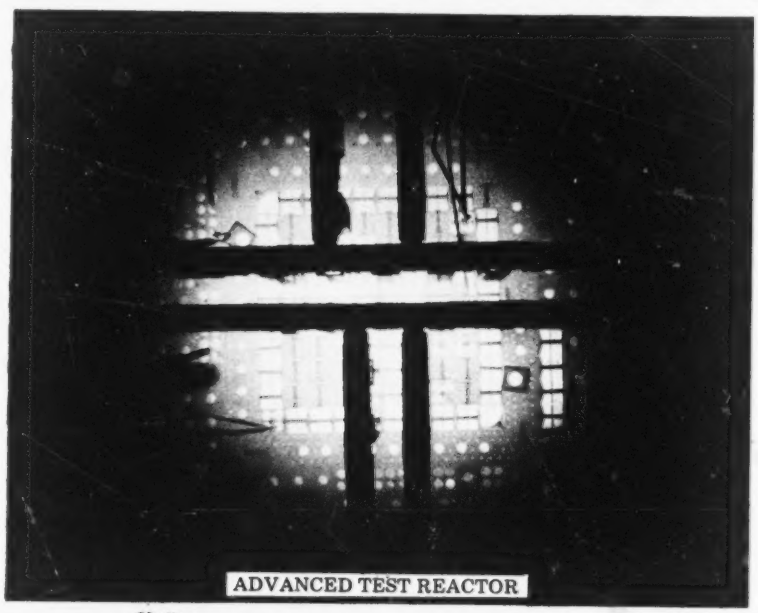
This film uses animation to show precisely how the USAEC's 250 Mw(t) Advanced Test Reactor design utilizes multiple flux traps to achieve exceptionally high neutron density in nine independent test loop positions. It describes the clover leaf, enriched fuel annulus that circumscribes the nine flux trap test positions, and the moving control components which vary flux and power in each test position. ATR was designed by Ebasco Services, Inc., as prime contractor, with Babcock & Wilcox Co. as nuclear subcontractors. Phillips Petroleum Co. prepared the conceptual design, and will operate the reactor.

0015
ARGONNE FAST SOURCE REACTOR (1960). 9 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

The Fast Source Reactor is a laboratory source of neutrons—not an experimental reactor—with a power level of 1000 watts. The film describes the reactor assembly and its usefulness as a readily available source of neutrons in a wide range of flux levels and flux spectra. The reactor was designed and built by ANL's Idaho Division at the USAEC's National Reactor Testing Station, Idaho. By animation and live action, information is given on the core and its positioning, two methods of changing reactivity, the cooling system, the thermal column, and the various access-beam holes. Its uses include the following: beams to test neutron spectrometers and checking


ADVANCED TEST REACTOR

complex instrumentation prior to use in operating reactors.

0236
OAK RIDGE RESEARCH REACTOR (1958). 20 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Summarizes the components, facilities, uses, and operation of the Oak Ridge Research Reactor, a tank type, heterogeneous reactor, immersed in a pool, designed to operate at 20 to 30 Mw.

0353
SPERT DESTRUCTIVE TEST, PART I, On Aluminum, Highly Enriched Plate Type Core (1965). 15 minutes, color.

Suitable for Understanding Level-3.

Produced by Phillips Petroleum Company for USAEC. For sale by NAC. NOT cleared for television.

Documents the destructive test program of a highly enriched, aluminum plate-type core in the SPERT-I reactor at the National Reactor Testing Station in Idaho. Beginning with the initial phases of the program, the film portrays special facility modifications required and the design and testing of instrumentation. Transient testing into the region of limited core damage is described, including views of the resultant rippled, bowed, and melted fuel plates. Slow motion studies, in both color and black and white, show the effects of the final core destruction test on November 5, 1962. The post-destructive core disassembly and examination is shown in detail, and the film concludes with a summary of the reactor power, fuel temperature, transient pressure, and energy release.

SAFETY, WASTE DISPOSAL, AND MONITORING

0010
AIR AND GAS CLEANING FOR NUCLEAR ENERGY (1964). 30 minutes, color.

Suitable for Understanding Level-3.

Produced by Oak Ridge National Laboratory. For sale by NAC.

Portrays the need for, and development of, high efficiency filters for the nuclear energy industry; the manufacture of such filters; their inspection at USAEC Quality Assurance Stations before installation at nuclear sites; the in-place testing of filters as an effective contamination control program; and current research and development in the area of high efficiency mechanical air cleaning. The R&D activity, filmed at Harvard Air Cleaning Laboratory, Oak Ridge National Laboratory, and Edgewood Arsenal, covers iodine collection systems; fine aerosol reaction on filters; in-pile and out-of-pile fuel meltdown studies; the production and dispersion of solid aerosols in an exploding wire aerosol generator; foam tests to encapsulate radioactive materials; rare gas absorption studies; experiments with diffusion boards as a gas and particulate removal surface; cleaning of stainless steel wool filters with shock waves; and the dispersal of radioactive wastes by incineration.

0076
BETA RAY SPECTROMETER (1963). 7 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC's Argonne National Laboratory. For sale by NAC.

By animation and live action, this film explains the principles and working of the Coincidence Beta Ray Spectrometer, a device which is used to measure the intensity and direction of electron emissions known as beta particles. Components of the device are shown and assembled. A source is introduced. Masking for beam direction and size is demonstrated. Detectors are shown and explained.

0097
CONTROLLING RECORDS FIRES WITH HIGH EXPANSION FOAM (1966). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Idaho Operations Office. For sale by NAC.

Simplified description of high-expansion foam and its characteristics as a fire-fighting agent, particularly with respect to fires involving paper and photographic records in typical open file storage.

The film summarizes the result of high-expansion foam tests conducted at the National Reactor Testing Station in August 1965. The tests disclosed that high-expansion foam provides fast, effective, and possibly least damaging means of extinguishing fires involving various kinds of records, including x-ray films, motion picture films and photographic prints.

Special problems encountered in using the foam are dealt with in the film, together with various means of coping with such fires.

The film concludes with the test findings that certain types of records containers, labeling methods and storage arrangements are superior to others in minimizing damage from both fires and extinguishing agents.

HONORS: ANZAAS International Scientific Film Exhibition, Australia & New Zealand; 14th International Electronic & Nuclear Congress, Rome, Italy; 19th International Electronics and Communications Exhibit, Rome, Italy.

0117
EXPERIMENTS IN CONTROLLING BRUSH FIRES WITH DETERGENT FOAM (1965). 6½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Grass, brush, and forest fires cause an annual loss in the United States close to a quarter billion dollars. This film describes a series of tests by Argonne National Laboratory to explore the use of detergent foam as a fire break. Experiments were conducted with the Fire Protection Department's forestry jeep, which has a 265-gallon water tank and rotary gear pump. A detergent and water solution is sprayed on a nylon mesh while air is forced through the openings in the mesh by a large fan. This produces a detergent foam which has been expanded approximately 1000 times. The foam is delivered through a canvas tube at the rate of 5000 cubic feet of foam per minute. In three tests detergent foam appeared to be effective.

0132
FIRE FIGHTING IN THE NUCLEAR AGE (1960). 14 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by Calvin Productions. For sale by NAC.

Points out that radiation is just another hazard in fire fighting which can be handled with proper training. The film uses the USAEC Fire Department at the National Reactor Testing Station in Idaho as the example, showing its training. Techniques and procedures are illustrated in the fighting of a mock fire created for this film: A constant air monitor automatically rings the alarm when the fire reaches stored radioactive materials and radiation is released; the fire headquarters check the building inspection report to find out where radioactive materials are stored in the burning building; fire trucks approach the building upwind to avoid possible airborne radiation; firemen don special protective clothing in addition to standard protective gear; the entrance-way to the burning building is monitored before firemen enter, and frequent radiation checks are made during the fire-fighting period; firemen observe time-distance-shielding plan to protect themselves (remain in radiation area shortest possible time, stay as far away from

burning radioactive materials as possible, place available shielding material between themselves and the fire); each fireman is checked with a monitor as he leaves the fire; all protective clothing is removed and stacked for monitoring and decontamination; each man checks his film dosimeter to see if he was exposed to radiation; fire-fighting equipment is checked for contamination; personnel are rechecked for radiation after removal of protective gear; film badges are checked; and all personnel scrub down.

FIRE LOSS MANAGEMENT, PART II, COMPUTER INSTALLATIONS
. . . . . See page 41.

0193
LIVING WITH A GLOVED BOX (1964). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by the USAEC's Lawrence Berkeley Laboratory. For sale by NAC.

Explains the principles and techniques of working with a gloved box—an enclosure designed for handling radioactive materials of low activity which present a hazard primarily through inhalation and ingestion. The film opens with an explanation of how air currents and turbulences carry various substances, some of which may be hazardous. It shows why highly toxic materials like plutonium can best be handled in a gloved box. The principles of the gloved box are then explained in detail. Such items are covered as: the air flow and pressures within the box; the "bagging in" and "bagging out" of materials; the procedures for changing gloves on the box; the changing of the filter, and a method for handling a fire within the box.

0432
PROJECT SALT VAULT (1969). 11 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

By the end of this century, half of all the electricity in the United States will be supplied by nuclear plants—plants that will produce radioactive wastes which must be disposed of. Project Salt Vault deals with a two-year study carried out by Oak Ridge National Laboratory on the feasibility of permanent disposal of these high-level wastes in vacated salt mines, and the key steps of such disposal at an abandoned salt mine in Kansas. Included are scenes of radioactive material being lowered into the 1,000-foot-deep mine for burial, as well as showing the myriad of necessary operations associated with the undertaking. Although the primary objective was to demonstrate the equipment and operations required for safe and economic disposal of high-level, solid wastes in salt mines, it also resulted in the collection of data needed for the design of an actual disposal facility.

RADIATION ACCIDENT PATIENTS
. . . . . See page 47.

RADIATION DETECTION BY IONIZATION
. . . See page 36.

RADIATION DETECTION BY SCINTILLATION
. . . . . See page 36.

RADIATION PROTECTION IN NUCLEAR MEDICINE
. . . . . See page 46.

ORDER BY FILM NUMBER AND TITLE

0312
R-A-P: RADIOLOGICAL ASSISTANCE PROGRAM (1965). 26½ minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced for the USAEC by J. L. Feierbacher. For sale by NAC.

Shows the readiness and proficiency of radiological assistance teams in various re-enacted instances of emergencies for audiences concerned with problems in dealing with radioactive materials.

The R-A-P team's effectiveness is shown to be dependent on the cooperation of other groups and individuals at different levels of government and business. To illustrate this, there are three main stories in the film: The first traces the hunt for a radioactive source lost from a small industrial plant. The trail, via helicopter and police cars, takes the R-A-P team to a municipal dump. The second case is the problem of leaking radioactive vapor from a sealed system in a research laboratory. The third is the story of a fire in a uranium products plant that gives a R-A-P team the additional public information job of coping with a community which mistakenly assumes it is threatened with a disaster.

Since, despite every safeguard, accidents do happen—detailed reenactments in this film of the steps and measures taken to deal with these radiological emergencies show the operations of R-A-P teams as they put to work their specialized professional skills and equipment.

HONORS: Safety on the Screen, N. Y Safety Council.

REACTOR SAFETY RESEARCH
. . . . . See page 54.

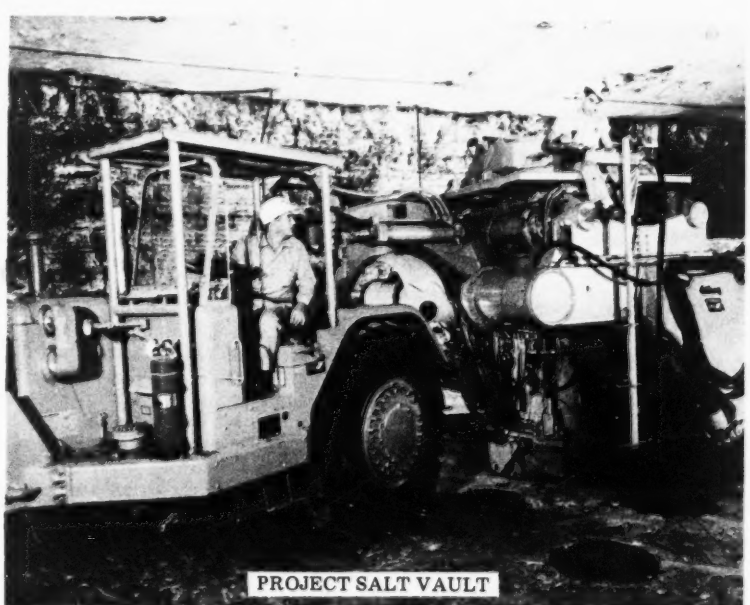
RETIREMENT OF THE HALLAM NUCLEAR POWER FACILITY
. . . . . See page 54.

RFD-2 . . . . . See page 58.

0343
THE SL-1 ACCIDENT, PHASES 1 AND 2 (1962). 40 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by John Feierbacher. For sale (with prior authorization from the Audio-Vi-



PROJECT SALT VAULT

sual Section, Office of Information Services, USAEC) by NAC. NOT cleared for television, except with the express permission of the USAEC.

This semitechnical film on the SL-1 accident at the National Reactor Testing Station, Idaho, was produced primarily for studying and improving the methods and techniques of handling nuclear emergencies. A combination of actual and reenacted scenes, the film presents a concise résumé of what happened and how the USAEC and its operating contractors reacted to the situation, i.e., the activities associated with Phases 1 and 2 of the postaccident operations. Phase 1 involved the location, rescue, and recovery of the three personnel and the determination of how much contamination had been released to the environment. Phase 2 involved determining whether the reactor was nuclearly safe. Results of the investigation of the accident indicate a need for readily available high-range survey instruments, careful use of health physicists, preplanning, etc.; in addition, important information on reactor technology and the administrative procedures governing reactor development has resulted. Brief information is given on the start of Phase 3 work, involving the decontamination and disassembly of the reactor to determine what destroyed it. This is detailed in THE SL-1 ACCIDENT, PHASE 3 described below.

ORDER BY FILM NUMBER AND TITLE

0344

THE SL-1 ACCIDENT, PHASE 3 (1962). 57 minutes, color.

Suitable for Understanding Level-3.

Produced by the USAEC by John L. Feierbacher, consultant. For sale (with prior authorization from the Audio-Visual Section, Office of Information Services, USAEC) by NAC. NOT cleared for television, except with the express permission of the USAEC.

This is a sequel to "The SL-1 Accident, Phases 1 and 2." It is a factual and historic documentary report on what was done with the SL-1 reactor and building commencing about four months following the accidental nuclear excursion that occurred January 3, 1961. It features a step-by-step reenactment of the accident, animation of the events believed to have taken place during and immediately following the excursion, and a postulation of the cause. The film documents substantially the recovery operations specified under contract with General Electric Company, which was charged with: gathering evidence pertaining to the accident; preparing the facility for core removal; recovery of the reactor core for remote-control examination; demolition of the reactor building; decontamination of the SL-1 site and restoration to habitable status; and presentation of an accident analysis report to the USAEC.

SNAPTRAN-2/10A WATER IMMERSION TEST

. . . . . See page 58.

0354

SRE CORE RECOVERY FOLLOWING FUEL-ELEMENT DAMAGE (1962). 29½ minutes, color.

Suitable for Understanding Level-3.

Produced by Atomics International for the USAEC. For sale by NAC.

Describes (1) design features of the Sodium Reactor Experiment (SRE) near Santa Susana, California (designed, constructed, and operated for the USAEC by Atomics International); (2) important operations attainments; (3) circumstances in 1959 which resulted in severe damage to the reactor core and release of about 10,000 curies of fission-product activity; (4) equipment, methods, and procedures employed to contain gaseous atmospheres, to remove radioactive debris (including pieces of fuel elements from the reactor system), and to replace affected core-moderator cans; and (5) modifications made to prevent similar future difficulties. Included are actual motion-picture scenes of the highly radioactive reactor core and animation of fuel-element damage and breakage. A relatively small number of men performed the recovery-work operations; none of the men received more than the standard permissible amount of radiation exposure, and there were no physical injuries. Demonstrated was the fact that extensive maintenance work can be conducted on the entire plant complex of a sodium-cooled nuclear-power reactor with a reasonable degree of effort.

0391

WASTE DISPOSAL BY HYDRAULIC FRACTURING (1966). 11 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Depicts the development, at Oak Ridge National Laboratory, of a process for the disposal of intermediate-level radioactive wastes in underground bedded shale formations. The film shows an actual injection of material into the formation, supplemented by animation which portrays the manner in which the grout is forced down into the well and then into the fracture for permanent disposal.

0393

THE WOODEN OVERCOAT (1965). 14 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by the Sandia Corporation. For sale by NAC.

Because radioactive materials are being shipped throughout the world in increasing quantities, research programs are being conducted to develop shipping containers for radioactive materials which are virtually accident-safe. In support of these programs, the United States Atomic Energy Commission has asked its contractors to submit designs for containers. Sandia Corporation of Albuquerque, New Mexico, has designed and tested a wooden outer shell for existing metal containers which will withstand a 30-foot drop, a one-hour petroleum fire, and 24-hour water immersion without the seal of the inner metal container of radioactive material being broken. This technical film report shows the development and testing of the wooden containers as well as the buildup of the containers from rings of plywood. Photography of actual drop tests and fire tests is included to demonstrate the resistance of the container to both impact shock and fire exposure. Results of tests show that a container having six-inch thick shells of fir plywood will adequately protect the inner metal container of radioactive material.

SNAP AND SPACE PROGRAMS

0124

FABRICATION OF SNAP–7D FUEL SOURCES (1964). 12 minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Oak Ridge National Laboratory. For sale by NAC.

Semitechnical film which describes the fabrication of strontium-90 fuel capsules for the SNAP-7D generator which powers an unmanned Navy Weather Station in the Gulf of Mexico. Purified strontium-90 carbonate was processed at ORNL's Fission Products Development Laboratory to strontium-90 titanate, pressed into pellets and then encapsulated. Most of the film is devoted to the pelletizing and encapsulating operations within the hot cells of the FPDL.

ORDER BY FILM NUMBER AND TITLE

FIRST REACTOR IN SPACE: SNAP 10-A . . . . See page 30.

NUCLEAR POWER FOR SPACE: SNAP-9-A
. . . . . See page 30.

0230
NUCLEAR REACTOR SPACE POWER SYSTEMS (1964). 8 minutes, color.

Suitable for Understanding Level-3.

Produced by Atomics International. For sale by NAC.

Summarizes the program to develop nuclear reactor power supplies for large space vehicles. Fabrication and testing of a 500-watt thermoelectric system, a 3,000-watt turboelectric system, and a reactor for a 35,000-watt turboelectric system are highlighted. Also featured is a 300—1,000-kwe turboelectric system. The reliability, high power levels, long unattended operating life, and safety characteristics of space nuclear power systems are reviewed. These units are being developed for the USAEC by Atomics International and Pratt & Whitney.

OUR NEAREST STAR
. . . . . See page 30.

PAX ATOM IS: SNAP-7 TERRESTRIAL ISOTOPIC POWER SYSTEMS . See page 30.

0323
RFD-2 (1965). 14 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by the Sandia Corporation. For sale by NAC. NOT cleared for television.

Outlines the design and test work performed by Sandia Corporation in assessing the nuclear safety aspects of a SNAP-19 type isotopic generator designed to supply electrical power in certain communications satellites. The film describes the flight of an inert reactor aboard a Scout rocket to investigate the burnup and disassembly of the dummy reactor upon re-entry. Shown are the instrumentation systems developed by Sandia to transmit to ground-based receiving stations information on the burnup of the reactor and its fuel rods.

The pre-flight test program conducted at Sandia, and shown in the film, included ejection tests of fuel rod experiments, tests on the flotation system designed to recover the test vehicle from the ocean, radiant heat testing of the protective shell of the vehicle, and acoustic noise tests to simulate rocket motor noise and vibration.

Some scenes at the tracking and data-recording station on Bermuda precede the film report of the launch and re-entry of the dummy reactor. A brief analysis is made of data gained from the test program to summarize the efforts being made to minimize the hazard of using reactors and isotopic generators in space applications.

0345
SNAP-3 OPERATIONAL TESTS (1960). 18 minutes, color.

Suitable for Understanding Level-3.

Produced for the USAEC by the Martin Company, Nuclear Division. For sale by NAC.

Describes operational tests (vibration, shock, acceleration, fire, explosion, land and sea impact, effects of salt water, aerodynamic heating, etc.) on the 4-lb SNAP-3 isotope-power unit, which uses ^{210}Po to generate more than 3 watts as a source of auxiliary power for space vehicles. Conclusion: SNAP-3 will operate effectively on launch and in orbit.

SNAP-8: SYSTEM FOR NUCLEAR AUXILIARY POWER . . . . . See page 31.

0348
SNAPTRAN-2/10A WATER IMMERSION TEST (1965). 20 minutes, color.

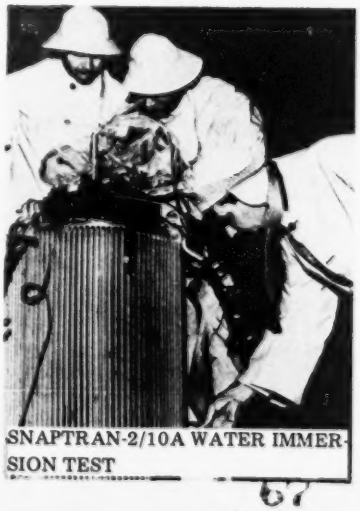
Suitable for Understanding Level-3.

Produced by Phillips Petroleum Company as contractor for the USAEC at the National Reactor Testing Station, Idaho. For sale by NAC. NOT cleared for television.

Portrays a test which investigated the effects of water immersion on a SNAP-10A reactor, a system designed to provide 500 watts of electric energy for powering equipment in a space satellite. Such an accident conceivably could occur if a SNAP-10A reactor mission aborted on launch and the reactor fell into water.

Describes the basic components of the SNAP-10A reactor, its method of control, non-nuclear tests which established the reactor's physical state after terminal velocity entry into water, and the reactor's neutronic behavior when immersed in water. The testing site and supporting facilities are described. Step-by-step coverage includes preparing the reactor for testing, reactor operation, and preparations for the destructive test, including the functions of various supporting groups. The destructive test itself is shown from six vantage points, including a variety of slow motion sequences, and ultra-high speed silhouette photography of the reactor vessel expansion during disassembly.

Animation and live scenes explain reactor behavior during the test and the subsequent radiological results. The information gained and how this information can be applied to assess nuclear accidents is discussed.



SNAPTRAN-2/10A WATER IMMERSION TEST

0472
SPACE AND THE ATOM (1971). 27½ minutes, color.

Suitable for Understanding Level-3.

Produced by USAEC's Argonne National Laboratory. For sale by NAC.

Success in the coming decades of space exploration will in large measure be predicated upon an increasing use of nuclear energy. As payloads become larger and mission lifetimes become longer, the use of nuclear energy represents the only alternative to mission success—especially for on-board electrical power and higher powered propulsion systems. This film reports on many of the past successes of nuclear energy in space, such as the various SNAP generators used on SNAP-3A, 9A and 10A. It also discusses the success of these radioisotopic generators on the recent Apollo lunar missions and Nimbus weather satellites. It also delineates the twelve year joint efforts of the United States Atomic Energy Commission and the National Aeronautics and Space Administration to develop a nuclear rocket engine.

ORDER BY FILM NUMBER AND TITLE

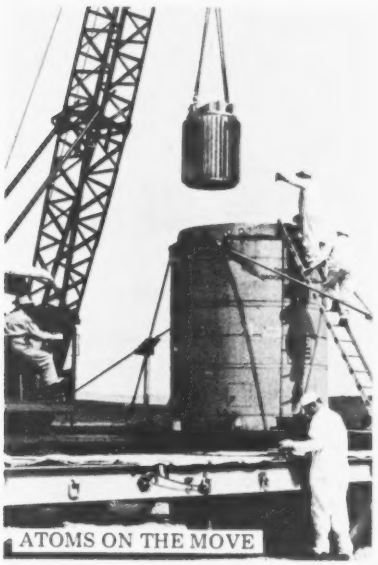
TRANSPORTATION

ATOMIC POWER TODAY: SERVICE WITH SAFETY
. . . . . See page 22.

0070
ATOMS ON THE MOVE: Transportation of Radioactive Materials (1966). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

Produced by Bennie Korzen Productions for the USAEC. For sale by NAC.



ATOMS ON THE MOVE

Surveys the various means of transporting radioactive materials and the safety aspects underlying their packaging and handling. Using animation and live action photography, the film illustrates that by their very nature, radioactive materials are varied and so are the potential hazards associated with shipping and using them. By evaluating the form of the material and the kind and the quantity of radioactivity, one may determine how the materials are properly packaged for shipment. Most radioactive materials are safely shipped by common carrier. The film shows typical shipments enroute: atoms on the move everyday, everywhere by train, truck, aircraft and ship. Varied items are dealt with: ores; atomic fuel for reactors; spent fuel being returned for processing; atomic weapons; radioisotopes for medicine, research and industry; and atomic wastes being shipped for disposal. The film discusses responsibilities of agencies such as the AEC, the ICC, Bureau of Explosives, Federal Aviation Agency, Coast Guard and state and local offices. Also shown are some aspects of safety research and development designed to limit the consequences of an accident involving these materials. An accident situation and cleanup are shown. We learn that radioactive materials are invaluable tools and products in today's industry and in our daily lives, and how modern transportation moves these materials quickly, quietly, and safely.

R-A-P: RADIOLOGICAL ASSISTANCE PROGRAM
. . . . . See page 56.

SAFETY IN SALT: The Transportation, Handling and Disposal of Radioactive Waste
. . . . . See page 29.

0380

TRANSPORTATION OF RADIOACTIVE MATERIALS, PART II, ACCIDENTS (1965). 34½ minutes, black and white.

Suitable for Understanding Level-3.

Produced by U. S. Naval Photographic Center for the USAEC. For sale by NAC.

In a lecture, Commission Safety Engineer Francis L. Brannigan discusses the control of transportation accidents involving radioactive materials. Liberal use is made of charts, pictures, actual packages, and off-screen film footage to show that only a small proportion of shipments of radioactive materials can present any real danger in the event of accident. ICC shipping labels are shown and explained and the regulations relating to individual packages briefly discussed. A typical package is opened step-by-step from the outer container down to the final inner container, holding a radioisotope. Included is a simulated accident with a leaking container which causes unnecessary alarm. A simulated accident which might cause serious consequences is shown. The question of radioactive material becoming airborne in an accident, the degree of hazard, and precautions to be taken are then discussed. Radioactive contamination, shipping of fissile materials, nuclear weapons accidents, and the availability of radiological assistance are discussed in turn.

WOODEN OVERCOAT
. . . . . See page 57.

ADVICE TO BORROWERS

ADVICE TO NEW BORROWERS

As part of its information and education program, the U. S. Atomic Energy Commission maintains one consolidated motion-picture library in Oak Ridge, separate libraries in Alaska, Hawaii, and Puerto Rico, and special sublibraries which serve regional needs from which qualified borrowers throughout the United States may obtain 16-mm sound films that explain various aspects of atomic energy. This two part catalog deals with INFORMATION–EDUCATION and TECHNICAL–PROFESSIONAL films.

All these films are loaned free, and only for educational, nonprofit, and noncommercial screenings.

The film titles, film descriptions and cross references are listed alphabetically in Part One and Part Two within each category.

Additional copies of this catalog may be obtained from the Audio-Visual Section, Office of Information Services, U. S. Atomic Energy Commission, Washington, D. C. 20545; or the Technical Information Center, U. S. Atomic Energy Commission, P. O. Box 62, Oak Ridge, Tenn. 37830.

Catalog inserts and supplements are issued periodically.

ADVICE TO TEACHERS

A special catalog CLASSROOM SCIENCE FILMS lists selected AEC motion pictures under broad teaching classifications, such as "Social Studies," "General Science," "Biology," "Chemistry," "Physics," etc., and describes the films for their current classroom and instructional value. This catalog is available from the addresses listed above.

WHO MAY BORROW

Bona fide representatives of educational, civic, industrial, professional, youth activity, and government organizations are invited to borrow films. Because of wear and tear that result from repeated projection, films are loaned for *group* showings, and *not* for screening before individuals or in homes. Because custody of the films involves both legal and financial responsibility, films cannot be loaned to minors.

HOW TO ORDER

The USAEC consolidated Motion Picture Library enjoys heavy patronage throughout the year, so it is important that borrowers needing particular titles should make their requests as far in advance of their scheduled showing date as possible. Since some titles are booked solidly in advance for several months, borrowers should attempt to specify at least two other acceptable titles and one other acceptable alternate showing date. In making requests, always include both the film number and the full film title and use the request forms provided with this catalog.

CIVIL RIGHTS

The loan of films directly or indirectly from a USAEC motion picture library constitutes Federal financial assistance and is subject to the provisions of Title VI of the Civil Rights Act of 1964 and implementing regulations. No person shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity in which such films are used.

LOAN REQUIREMENTS

The following requirements apply to all films and all borrowers, regardless of which USAEC Motion Picture Library provides the service:

1. Projection must be on good motion picture sound equipment, and by a *trained* operator.
2. No borrower under any circumstances may remove—even temporarily—any footage from USAEC library films on loan to him, either to delete damaged sprocket holes or to edit or digest selected scenes.
3. Films do break, and occasionally will require splicing by the borrower. However, we prefer that damaged films be returned to the libraries for the professional repairs available there. Do not use "scotch" tape for emergency splices. Unrepaired damage should be noted on the computer statistical card so that the film may be repaired before it is shipped to the next borrower.
4. Borrowers planning to show a number of films on a protracted schedule should request delivery of specific films on a staggered schedule to facilitate maximum use by other borrowers. No borrower may hold a film past scheduled return date without express prior permission of the issuing USAEC library.
5. No borrower may release a USAEC film from his personal possession for reloan to another individual or agency without express prior permission of the issuing USAEC library. Except where heavy demand requires tighter scheduling, borrowers are normally allowed to retain films for two or three days.
6. Borrowers are obligated to complete the computer statistical card form enclosed with each film.

7. Films are shipped from the libraries at government expense, but return shipment charges are borne by the borrower.

8. Films are normally shipped by 4th class Book Rate, but it is the borrower's responsibility to use any available means—including air express, air mail, or personal delivery—to assure that films being returned will reach the libraries on or before the due date.

9. Rewind films for return.

Optimum service to the thousands of borrowers utilizing USAEC Motion Picture Libraries is possible only when each individual borrower complies fully with these requirements. Failure of a borrower to follow the instructions of the library that has serviced his request may result in suspension of the service to the borrower and his organization.

TELEVISION USE

Television stations may order films for unsponsored public service or sustaining telecasts, except those titles described as "NOT Cleared for Television." Films selected for television use must be telecast in their entirety.

CANADIAN BORROWERS

Residents of Canada may obtain many of the films in this catalog from the *National Science Film Library*, Canadian Film Institute, 1762 Carling St., Ottawa 13, Canada, with a service charge for handling.

ADVICE TO FOREIGN BORROWERS

Because most of the titles stocked by the USAEC motion picture film libraries are in heavy demand by U. S. borrowers and because shipments abroad would involve lengthy, nonproductive periods in transit, it is not considered practical to extend this film library service to other than U. S. borrowers.

However, a number of titles listed in this catalog have been acquired by the U. S. Information Agency for use in various U. S. Information Service film libraries throughout the world. Residents of each nation should seek assistance directly from the nearest U. S. Information Service at the American Embassy in the capital city of their country.

In addition, prints owned by the USAEC are available for loan to the U. S. Information Agency in Washington, which will arrange to provide prints on a brief loan basis to the U. S. Information Service posts overseas.

Also, the USAEC stocks three film libraries overseas, at the American embassies in Tokyo, Brussels, and Buenos Aires. The films are maintained in behalf of the Commission by the U. S. Information Service posts at those embassies. Please direct your inquiry to the USAEC office at the American Embassy.

In addition, many of the films in this catalog are available from the film library of the International Atomic Energy Agency, Vienna, Austria; the National Science Film Library, Ottawa, Canada; the American Film Library, The Hague, Holland; and in the Film Section of the Personnel Administration Council, Stockholm, Sweden.

WHERE TO PURCHASE PRINTS

Most films listed in this catalog may be purchased from NAC (National Audiovisual Center) or from private commercial suppliers—NOT the USAEC. It is suggested that organizations which have continuing requirements for repeated screening of the same film may find it more satisfactory, and perhaps more economical, to own a print than to borrow it.

In each film description, the supplier from whom prints may be purchased is indicated. Prospective purchasers should obtain up-to-date quotations before ordering, by writing to the proper supplier:

AEROJET-GENERAL CORPORATION
Electronics Division
Von Karman Center
Azusa, California 91703

AUDIO PRODUCTIONS
630 9th Avenue
New York, New York 10036

BAY STATE FILM PRODUCTIONS, INC.
Post Office Box 129
Springfield, Massachusetts 01101

COLOR REPRODUCTION CO.
7936 Santa Monica Boulevard
Hollywood, California 90046

CORONET INSTRUCTIONAL FILMS
65 East South Water Street
Chicago, Illinois 60601

EDUCATION DEVELOPMENT CENTER
Modern Learning Aids
Post Office Box 302
Rochester, New York 14603

GENERAL ELECTRIC COMPANY
G. E. Educational Films
60 Washington Avenue
Schenectady, New York 12305

GERALD PRODUCTIONS, INC.
421 West 54th Street
New York, New York 10019

HANDEL FILM CORPORATION
8730 Sunset Boulevard
West Hollywood, California 90069

HOLT, RINEHART AND WINSTON, INC.
383 Madison Avenue
New York, New York 10017

IOWA STATE UNIVERSITY
Film Production Unit
Alice Norton House
Ames, Iowa 50010

McGRAW-HILL FILMS
330 West 42nd Street
New York, New York 10036

McNAMARA PRODUCTIONS
170 South Beverly Road
Beverly Hills, California 90212

MODE ART PICTURES, INC.
1022 Forbes Avenue
Pittsburgh, Pennsylvania 15219

NAC
National Audio-Visual Center (GSA)
Washington, D. C. 20409

N.E.T. TELEVISION, INC.
2715 Packard Road
Ann Arbor, Michigan 48104

OWEN MURPHY PRODUCTION, INC.
274 Madison Avenue
New York, New York 10016

U. S. DEPARTMENT OF AGRICULTURE
Motion Picture Service
Room 1081, South Building
Washington, D. C. 20250

UNIVERSAL EDUCATION AND VISUAL ARTS
221 Park Avenue South
New York, New York 10003

WRS MOTION PICTURE LABORATORY
210 Semple Street
Pittsburgh, Pennsylvania 15213

STOCK FOOTAGE

To encourage education and information in the field of atomic energy, the USAEC has made available for motion picture and television producers color stock film footage covering nearly all aspects of this broad program.

Color stock footage in 16mm is available from the completed motion pictures made by the USAEC and its national laboratories and contractors. Producers are invited to make footage counts on films borrowed from the film libraries and then to contact the Audio-Visual Section, as noted below, for information on how to obtain duplicating material. Producers are *not* permitted to clip films borrowed from the film libraries.

Requests to search and draw from the color motion pictures and historic black-and-white stock footage, and any other inquiries, should be addressed to the Audio-Visual Section, Office of Information Services, U. S. Atomic Energy Commission, Washington, D. C. 20545, or to the Central Motion Picture Stock Footage Library (NACT), 1411 South Fern Street, Arlington, Virginia 22202.

TI-234

REQUEST FOR AEC FILMS

(2-7)

Instructions: Fill in the form below and send a copy to USAEC Film Library, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830. Read reverse side of this form. Ignore numbers in parentheses. Please Print or Type

Please write appropriate numbers in boxes [ ][ ] ① (8-9)

01 College, Jr. College, University
02 Elementary or High School
03 Federal Agency
04 State or other Municipal Organization
05 AEC Contractor
06 Professional or Technical Society
07 Civic or Service Club
08 TV Station
09 Commercial Organization
10 Other

Send Films To

Organization (10-45)

Address (46-69)

City ② (8-25)	State (26-29)	Zip Code (30-34)

Individual (35-58)	Date Requested (59-64)

Telephone Number	Requested By (Signature)

Film Number ③ (8-11)	Film Title	Show Date (12-17)	Alternate 1 Show Date (18-23)	Alternate 2 Show Date (24-29)	For TIC Use Do Not Fill In.

USAEC Technical Information Center, Oak Ridge, Tennessee

NOTICE TO FILM REQUESTER

You will receive film which has been cleaned and inspected by our Film Library and is in serviceable condition.

Projection must be on good 16-mm motion picture sound equipment and by a trained operator.

Film should be rewound after the last showing and be returned to the Technical Information Center on or before the due date.

You will be required to provide information on the size of the audience and other miscellaneous data, as well as observe the following:

1. Use any available means—including air express, air mail, or personal delivery—to assure that film being returned will reach the USAEC Film Library on or before the due date. **Return shipment charges are borne by the borrower.**
2. No borrower under any circumstances may remove—even temporarily—any footage from USAEC Library film on loan to him, either to delete damaged sprocket holes or to edit or digest selected scenes.
3. No borrower may hold a film past scheduled return date without express prior permission of the USAEC Film Library.
4. No borrower may release a USAEC film from his personal possession for reloan to another individual or agency without express prior permission of the USAEC Film Library.
5. Borrowers are obligated to complete and return to the USAEC Film Library a form concerning audience size and other miscellaneous data.

Optimum service to the thousands of borrowers utilizing the Film Library is possible only when each individual borrower complies fully with the above instructions.